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/ by John S. Billings.**

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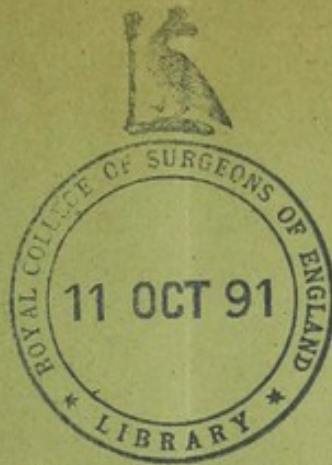
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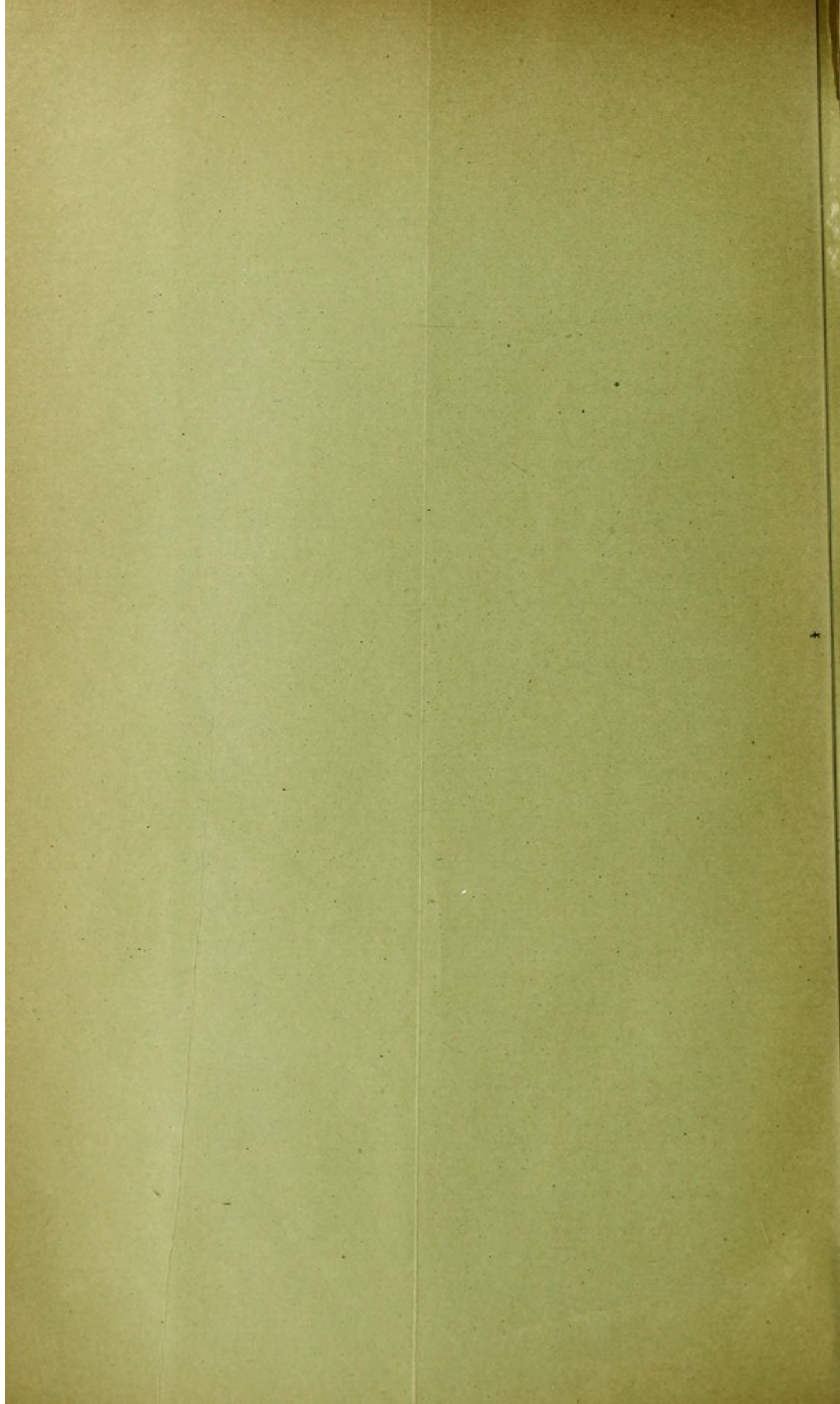
IDEALS OF MEDICAL EDUCATION.

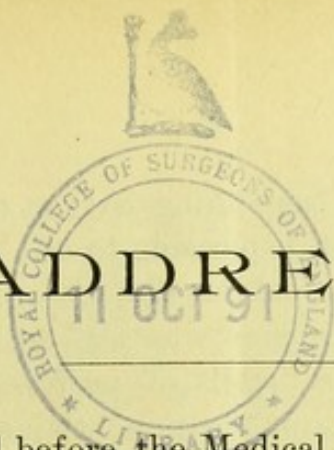
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THE ADDRESS IN MEDICINE,
Yale University, 1891.

By JOHN S. BILLINGS, M.D., LL.D.

Surgeon United States Army, Washington, D. C.





ADDRESS.

Address delivered before the Medical Faculty of Yale University, June 23, 1891, by JOHN S. BILLINGS, M.D., Surgeon U. S. Army, Washington, D. C.

WHEN the medical faculty of an ancient, famous, and progressive university honors a physician by the request that he will deliver an address to it, and to its friends, upon such an occasion as this, the subject of that address must be sought within certain limits. It should have some relation to the special work of the Faculty—to medical education as it was, or is, or should be. The fact that you have already had three addresses bearing on this subject by distinguished medical teachers, who are more familiar with its practical bearings and needs than I can be, does not authorize me to try another field, although it greatly increases my difficulty in selecting reflections and suggestions which are suited to the occasion and to the audience, and which, at the same time, will not be a wearisome repetition of what is already familiar to you. I know, however, that discourses of this kind are soon forgotten; were it otherwise, this would indeed be a hard world for address givers.

Of course the Medical Department of Yale is organized in the best possible manner, and is doing the best possible work,—under the circumstances. I do not know precisely what its organization is, or what work it is doing, or the exact circumstances which govern it, but I have no doubt it is safe to assume this. There is one circumstance, however, which very commonly affects medical schools and universities—and which, therefore, may possibly affect you—and that is the want of means to do everything that anybody may consider desirable. Perhaps, then, some remarks upon certain modern ideals of medical education, and upon first class medical schools and their cost, based upon data derived from other schools, may be of some interest,—especially in the light of Rochefoucauld's

aphorism that there is something in the misfortunes of our best friends which is not displeasing to us.

The great mass of the public—the majority of the voters of all parties, and of the women who are not voters, know little and care less about the details of professional education, or about the standard of qualification attained to by those to whom they entrust more or less of the care of their souls, their property, or their bodies. The popular feeling is, that in a free country every one should have the right to follow any occupation he likes, and employ for any purpose any one whom he selects, and that each party must take the consequences.

It is noteworthy, however, that each individual professing to hold this opinion, almost always makes an exception as to his own occupation if it is one involving skilled labor,—he is in favor of free trade in the abstract—and of limitations with regards to his own particular trade, either as to number of apprentices, as to time of study, or as to some form of trust which will, as far as possible, prevent competition in that special business. In one of its aspects, medicine is a trade, carried on for the purpose of making money in order to support the physician and his family, and to the majority of practitioners this is a very important aspect, although to very few of them is it the only one. Hence it is that medical faculties must consider schemes of medical education from this point of view also, not exclusively so by any means, but, nevertheless, with reference to the questions—what do we propose to offer?—how much will it cost us?—how much shall we charge for it? With reference to the first question, it is obvious that there are several quite different kinds of education which a medical faculty may offer to its students. It is by no means easy to decide as to the quality and quantity of the article offered by consulting only the advertisements, circulars, and prospectuses of the hundred and more medical schools in the United States, but even from these it can be seen that one can get a diploma of Doctor of Medicine in much less time, and at much less expense, from some schools than from others, and we all know that the diplomas of these different schools are guarantees of very different education and qualifications.

There are also several different ideals as to what is desirable in medical education. For instance, there is the ideal of the literary man, of the clergyman—of the laborer, and of other classes of the general public. There is the ideal of the man who wants to obtain a medical degree as soon and as cheaply as possible in order that he may commence practice; the ideal of the same man after he has obtained such a degree and has been for two or three years trying to get practice; and the ideal of the middle aged successful practitioner who has learned several things by experience since he graduated. Then we have the ideal of the Army and Navy examining boards; the ideal of the man of means who wants to become a specialist without ever going into general practice—and the ideal of the man who wishes to be an investigator and a teacher either from the love of science or from the desire for fame. Let us consider some of these ideals briefly. The chief demand of the great mass of the non-professional public is for general practitioners,—and the qualifications which these should possess may be summed up in the statement that they should be competent to recognize the forms of disease and injury which are common in the community in which they practice,—and should know, and be able to apply, the remedies which are most frequently used and found efficacious in such cases. They are expected, for the most part, to follow and not to lead—it is not necessary that they should be skilled in the refinements of modern pathology—or be thoroughly trained in minute anatomy or experimental physiology, or be great surgeons, or be well up in all the specialties. Observe that I say it is not *necessary*—it may be desirable, but in the majority of cases it is not practicable.

In their brief journey of life through this world, the great majority of people must travel on the routes and by the vehicles provided for them by others, and, fortunately, they are usually content to do so. They move in groups which are “personally conducted,” see the things they are told to see, try, with more or less success, to admire the things which they are told to admire, and their chief discomfort occurs when their conductors are either silent, or give contradictory orders, when it comes to the parting of the ways. Most travelers on

an Atlantic steamer accept without murmuring the edict that "Passengers are not allowed on the bridge."

The information which those who propose to earn their living by the general practice of medicine stand most in need of, is that which will enable them to recognize the ordinary emergencies of practice and to deal with them in the ordinary way. As students, their time, money, and zeal for study and investigation, are all usually more or less limited, and there are many things in a course in what is called the "higher medical education" which are of comparatively little use to them. The clinical instruction which they can get at a school in the region of country in which they intend to practice will often be more valuable to them than that which they could get at a distant school of greater repute, simply from the difference in the class of cases presenting themselves for treatment. "Good local pilots are in demand, although we have a Superintendent of the Coast Survey." In some respects, the old fashioned system of medical apprenticeships, in which the student spent from one to three years in the office of a physician in general practice before he went to a medical school to hear lectures, was a good one for producing these general practitioners. To learn to do such work easily and properly one must live among the sick, learn how they look, how they talk, how they are to be talked to and handled; and must do this at close quarters, and not by looking on from the top bench of an amphitheatre, or from the outer ring of a group of thirty or forty men standing around a bed. Moreover, it is the common everyday ailments and their effects and treatment that the student wants to become familiar with at first, rather than the rare cases. Cases of colic, of effects of over eating or drinking, of sore throats, croup or diphtheria, or scarlet fever or mumps, or the ordinary fevers, of simple fractures and dislocations, of bad cuts of the palm of the hand—are far more important to him from a business point of view than brain tumors or ligations of the innominate artery.

And these comparatively simple, every-day cases are just what the young man reading in the office of his preceptor may become familiar with. How many of the men without such experience, who graduate this year at our great medical

schools, have ever seen closely a case of measles, or scarlet fever, or incipient small-pox—or have actually looked into the throat of a child suffering from diphtheria, or have ever assisted in adjusting and dressing a fractured thigh bone, or in getting the clothing off from a case of extensive burn or scald? I have no doubt most of them could repeat the descriptions of these things which they have heard or read, but they are not as well prepared to deal with such cases in that unhesitating way which commands confidence, as is the man who has seen and touched one or two such cases in his preceptor's office, and has observed what that preceptor said and did. On the other hand, the number of practicing physicians who are qualified to act as preceptors, and who are willing to give the requisite time and attention to students, is very limited,—and with any other kind of preceptor, the student wastes much time, is apt to lose interest, and becomes idle and unfit for continuous mental effort.

If the student spent his apprentice year, or two years, in a preceptor's office either at the end of his first or second year's medical lectures, or after obtaining his degree, it would be much better for him,—but the latter course is open to the objection that he would probably think that he knew more than his preceptor. The Scotch medical schools prefer that the year spent as an articled pupil shall come after the first two years of education in a medical school. The decision of the British Medical Council has been that a five years' course of study shall be compulsory, and that the last year shall be spent in practical work.

Theoretically there is still a considerable amount of preliminary reading with a preceptor done in this country, but practically, this method of beginning the study of medicine is fast disappearing. Through the kindness of the officers of some of our large medical schools, I have obtained some data on this point from which I infer that in the eastern schools the proportion of students who claim to have read with a preceptor for one year before commencing lectures, is from 1.5 to 30 per cent., and in western and southern schools, from 25 to 60 per cent., but no doubt such reading, in the majority of cases, was merely nominal, and the student had seen little or nothing

of practice. In most schools the certificate of the preceptor is not required.

The ideal of the average student who is in a hurry to begin practice needs no special description. What he wants is to pass the examinations with the least possible labor,—the less he is compelled to take for his money the better he is pleased. The ideal of the majority of the medical profession as to what should be the minimum course of study for the degree of M. D. appears to be that the student should first obtain at least such a preliminary education as is furnished by our ordinary high schools, and then should study medicine four years, the first of which may be with a preceptor, and three of which are to be occupied in attending a graded course of lectures, the last two years being largely devoted to clinical and hospital instruction. About one-third of our medical schools have expressed their intention of carrying out this programme. As regards the time, it is not sufficient, according to European standards, but is perhaps the best general standard which can be fixed at present for the education of the general practitioner for this country. Its success depends upon whether the student has had the needed preliminary education. It is the want of this last which is the chief deficiency.

The ideal of the Army and Navy Examining Boards is that a Surgeon in the Government service should have received either the literary, classical, and mathematical training of the ordinary college course for the degree of Bachelor of Arts, or the training leading to a degree in scientific studies—and that after that he should have spent five years in medical studies, the last year as resident in a hospital.

This ideal cannot yet be enforced in either service, for the reason that they could not get enough men who come up to this standard to fill the vacancies, so that the actual standard is somewhat lower than this, although it is higher than the minimum standard of any medical school or of any State Board of Examiners. Through the courtesy of the Surgeon Generals of the Army and Navy, I am able to give you the following results of the work of their Examining Boards for the last ten years.

Before the Army Boards 348 candidates presented themselves during this period, of whom 76, or 22.3 per cent. were approved and passed; 31 were rejected for physical disqualifications; 90 failed to pass the preliminary examination; and the remainder failed to pass the medical examination. The rejections for physical defects are for the last three years only.

Before the Navy Boards 237 candidates presented themselves, of whom 55, or 23.1 per cent. were approved and passed; 75 were rejected for physical disqualifications; and the remainder either withdrew or failed to pass.

Evidently the standards of the two Boards are about the same. The proportion of those rejected for physical defects is noteworthy. In a general way we may say that about one-fourth of the candidates before such boards are approved—and one-fourth fail on the preliminary examination as to general education. Putting aside those rejected for physical causes, and making the necessary corrections for a certain number who came before the Boards more than once, we find that of 429 examined, 129 or 30.2 per cent. were successful.

Of those candidates who had a college degree, 34 per cent. succeeded, and of those who had no such degree, 28.9 per cent. succeeded. Of those candidates who had had one year's residence in hospital, 40 per cent. passed, while of those who had not been residents, only 21 per cent. were successful. The percentage of successful candidates from different schools varies greatly, ranging from 9 to 56 per cent. for those schools from which more than ten candidates presented themselves. I cannot go into details on this point, but may say that taking the Medical Schools of Harvard, Yale, the College of Physicians, and Bellevue Hospital of New York, the University of Pennsylvania, and the University of Virginia together, of 141 candidates, 65 or 46.1 per cent. succeeded, while for all the rest of the schools in a body, of 286 candidates, 64 or 22.3 per cent. succeeded.

The figures from Yale alone, are too small to draw accurate conclusions from, but in strict confidence I will tell you that of the five graduates of the Yale Medical School who came before the Army and Navy Boards during the last ten years, three, or 66.6 per cent. have passed. The greatest percentage of success-

ful candidates comes from those who were between 24 and 25 years of age when they graduated, being 31.7 per cent. as against 27.9 per cent. for those who were under 22, and 26.2 per cent. for those who were over 25 on graduation.

Admitting it to be a fact that different schools have different minimum standards for graduating Doctors of Medicine, to what extent are these differences necessary, or desirable? There is at present a very general demand that those schools which have the lower standards shall raise them to the ideal of the medical profession just stated. It seems as if the supply of physicians is now, in most parts of the country, in excess of the demand, the number of medical men being from two to three times as great among us, in proportion to the population, as it is in France or Germany, while the annual number of graduates also greatly exceeds the number of places to be filled.

Under these circumstances, there is necessarily a struggle for existence in which the men of inferior qualifications usually, though not always, fail. The schools, however, will not shape their course so much with reference to the real or supposed interests of the profession or of the public, as with reference to the demands of their immediate customers, the students, and many of these, as has been said, do not want any more education than is absolutely necessary to enable them to begin practice. The ability and inclination to pay for professional services differs greatly in different localities, and among different classes of people. Attempts to enforce a minimum time for the course, and a minimum for the number of lectures in certain specified branches, will not result in fixing a uniform minimum of results obtained, for this can only be assured and maintained by some system of inspection and testing of results which is independent of the schools, or, at all events, of each individual school. When, as Professor Sumner says: "A and B put their heads together to see what C ought to be made to do for D," there is small prospect of result so long as C is free to do as he likes.

In the Russian myth, when the raven brought the water of life and the water of death to the gray wolf, the first thing that the wolf did was to test their powers on the raven himself to

determine whether his task was properly done. The public do not have an opportunity of seeing the effect of such a test as this upon those who come to them from the schools professing to have obtained the knowledge of healing; if they had, the complaints of overcrowding in the profession would probably cease.

From a commercial point of view it seems plain that there are too many medical schools in this country, that the education which many of them are giving is a very poor one, and that the students who are attracted to these last by offers of a cheap and short course, waste their time and their money.

The only really efficient remedy for this state of affairs is a system of State examinations with minimum standards. This also has its evils, since it must lead to cramming, but it is the best we can do at present. It is urged by some that this minimum standard should be uniform throughout the United States—but in that case, it would be unnecessarily low in some parts of the country. The precise nature of the requirements in different regions depend on the density of population, and on the ability of the great mass of the people to pay enough to induce highly educated physicians to settle among them. It would be better if it were otherwise, and if everyone could have the benefit of the best professional skill, but matters are adjusted in this world largely by conflict of interests. Certainly no one who intends to practice medicine should be content with the least amount of knowledge which will enable him to pass the required examinations, whatever the standard of those examinations may be. Putting aside now this matter of a minimum standard, let us consider briefly an ideal of a medical education of a higher type.

In addition to the incipient family practitioner of ordinary qualifications—the beginners in the profession—there is need of, and employment for, highly skilled, thoroughly trained physicians and surgeons as family physicians, as consultants, as specialists, and as investigators and teachers.

There are two ways in which these needed men may be educated and developed. The first is by their commencing with the ordinary course of instruction for general practice in the manner just spoken of, and then going on, after graduation and

commencing practice, to study and perfect themselves in details—according to individual tastes and opportunities; and this has been the course pursued by a large number of our most distinguished American consultants and specialists. The other is to lay a broad and sound foundation of preliminary education before giving any attention to clinical study or practice. This means an education at least equivalent to that required of candidates for the degree of Bachelor of Arts from our leading universities, including Latin, French, and German, and mathematics to include trigonometry, and the elements of analytics. It should also include one year's work in a physical laboratory, two years' work in chemistry, two years' work in biology,—at least one year's work in practical anatomy—and one year's course in *materia medica*.

In other words, it requires that the youth of sixteen, having obtained a good high school education, shall go on to spend at least five years in additional study before he commences to see anything of practice. He should then spend at least three years more in special medical and clinical studies, during one year of which he should, if possible, reside in a hospital. If then his purpose is to become a specialist, an original investigator and a teacher, it is desirable that he should spend two years more in clinics and laboratories devoted to his special subject—and at least half of this time should, at present, be spent abroad. These are the broad outlines of what I suppose most physicians of the present day would consider a desirable scheme of medical education for an intelligent boy with a fair amount of liking for study, good health, and sufficient means to enable him to go through with it without making undue demands upon his parents or guardians.

You will observe that there are several qualifying clauses in that last sentence. The aphorism that it does not pay to give a five thousand dollar education to a five dollar boy, must be constantly borne in mind in considering these questions. On the other hand, it is also to be noted that in the preparation of educational schemes, it is not necessary to provide for the demands of youths of extraordinary ability and industry—for men of genius. Beds suitable for giants are not required as part of the stock of an ordinary furniture store, especially if

it require giants to make them. Some cases of disease will recover without treatment, though the cure may be hastened by proper management, some will die under any treatment, the result of some depends on the treatment. It is much the same in education. Some will acquire knowledge and power without special training,—others will never acquire those things under any training, but the career of many depends, to a large extent, on the training which they receive. The recent announcement of a compulsory four years course of medical studies by Harvard and the University of Pennsylvania, soon to be followed by a similar announcement from Columbia, looks towards this ideal.

The number of those who are obtaining a college education as a preparation for medical study has increased, and will still more increase as the competition among an excessive number of physicians becomes fiercer.

From information received from some of our leading medical schools for the present year, it appears that the proportion of students who have taken preliminary degrees before commencing the study of medicine varies from 14 to 43 per cent. in eastern schools, from 3 to 12 per cent. in western schools, and from 15 to 20 per cent. in southern schools.

Just here comes in a very difficult point. When shall general education cease and special training begin? The answer to this must depend largely on the individual, but it seems to me that the present tendency is to begin to specialize too soon. This early specialization of study and work may lead to more prompt pecuniary success, but not, I think, to so much ultimate happiness and usefulness as the longer continuance of study on broader lines. "For it is in knowledge as it is in plants: if you mean to use the plant it is no matter for the roots; but if you mean to remove it to grow, then it is more assured to rest upon root than slips; so the delivery of knowledge as it is now used, is of fair bodies of trees without the roots—good for the carpenter but not for the planter. But if you will have science grow, it is less matter for the shaft of body of the tree, so you look well to the taking up of the roots."*

* Lord Bacon.

In discussions on medical education and the duties of medical schools, we are too apt to lose sight of the fact that the best that the student can do in them is to begin to learn. If he does not study much longer and harder after he graduates than he does before, he will not become a successful physician. Moreover, the great majority of men have different capacities for learning certain things at different ages. They lose receptive power as they grow older.

Permit me to use here a personal illustration, and pardon the apparent egotism of an old gentleman who refers to his youthful days. Thirty-three years ago I began the study of medicine, having obtained the degree of Bachelor of Arts after the usual classical course of those days. It so happens that the smattering of Latin and Greek which I obtained has been of great use to me, and I may, therefore, be a prejudiced witness, but my acquaintance with many physicians at home and abroad has led me to believe that the ordinary college course in languages, mathematics, and literature is a very good foundation for the study of medicine, and I do not sympathize with those who demand that all who are to enter on this study shall substitute scientific studies for all the Greek and a part of the Latin of the usual course. This change is good for some but not for all. I had attended lectures in physics and chemistry but had done no laboratory work, and I could read easy French and German. Thus equipped I began to read anatomy, physiology, and the principles of medicine. Nominally I had a preceptor—but I do not think I saw him six times during the year which followed, for I was teaching school in another State. Nevertheless, he told me what books to read, and I read them. The next thing was to attend the prescribed two courses of lectures in a medical college in Cincinnati. Each course lasted about five months and was precisely the same. There was no laboratory course, and I began to attend clinical lectures the first day of the first course. One result of this was that I had to learn chemical manipulation, the practical use of the microscope, etc., at a later period when it was much more difficult. In fact I may say that I have been studying ever since to repair the deficiencies in my medical training and have never been able to catch up.

Probably a large number of physicians over fifty years of age have had much the same experience, and felt that there are certain things, such as the relation of trimethyloxyethylene-ammonium hydroxide in the body, or the causation of muscular contraction by migration of labile material between the inotagmata—the bearings and beauty of which might as well be left to younger men. Not that these things are specially difficult to understand, but they form a part of a new nomenclature which in most cases it is not worth the while of the older men to learn, because it is far more difficult for them to master it than it is for their sons. One of the most comfortable and satisfactory periods in a man's life is that when he first distinctly and clearly recognizes that in certain matters he is a hopelessly old foggy, and that he is not expected to know anything about them.

Having thus roughly sketched what is wanted in the way of medical education by different classes of students—the article for which there is market, let us next consider briefly what an university may wisely attempt to provide in this direction. Some suggestions on this point may perhaps be obtained from an examination of the condition of affairs as regards medical education in the University of Oxford.

The Corporation of Oxford has a little more than half the number of inhabitants possessed by the City of New Haven, and its relations to London are, in many respects, similar to those of New Haven with the cities of New York and Boston. For a number of years it has been urged by some physicians in England, that the University of Oxford, with her great resources, has not been doing as much for medical education as she should have done, and that it is her duty to establish and maintain a completely organized medical school of the usual pattern, using the small local hospital and dispensary facilities for the clinical side of the work.

On the other hand, other physicians, of whom my friend Sir Henry Acland may be taken as the representative, maintain that it is much better that Oxford should use her resources in giving a broad foundation of literary and scientific culture, including, for those who propose to study medicine, the means of special instruction in general biology—and comparative and

human anatomy, physiology, and pathology—and that the men thus prepared should go to the great Hospital Medical Schools of London to obtain their clinical training, after which, they may return and pass their final examinations and obtain the coveted degree of Doctor of Medicine from the university.

There is no doubt that this can be done, and that a great part of the scientific foundation of a complete medical training can be furnished by a well equipped university, with little or no reference to clinical instruction at the same time and place. This, for example, is the course followed by many of the students in the medical department of the University of Virginia, and it seems to me that there is also no doubt that the men who go through such a course of training, followed by clinical training in a great city, will have a better course of instruction, a wider experience, and a better chance of seeing and appreciating the methods of great clinical teachers, than would the majority of those who obtained their clinical as well as their scientific training in the small town, or than those who obtain all their instruction in a large school devoted exclusively to medical studies. Upon this last point I need not dwell, for Dr. Welch, in his address before you in 1888, has clearly pointed out the advantages of giving to a medical school an university atmosphere, and of making the union of the school and the university close and intimate. It should be noted, however, that the more true this is, the more it is the duty of an university to maintain such a school, because educational work which cannot be, or is not, done so well elsewhere, has superior claims upon university aid. The chief thing which can be said in favor of the attempt to attract a large number of medical students of average qualifications to an institution having the means to give the higher education are, first, that it brings in more money—and, second, that it enables those professors who desire advanced workers, to select these from a somewhat wider field. Also it should be remembered that the small hospitals of from 50 to 100 beds should be fully utilized for clinical teaching, even if they cannot furnish all the clinical material that is desirable for a complete course of instruction.

It must be confessed that nearly all our great American universities are unwilling to apply their funds to the creation and maintenance of a well equipped medical department. They

are willing to have such a department no doubt, but they want the money for establishing and maintaining it to be provided in addition to the money which has been, or is to be, provided for the general purposes of the university. The ideal university culture of the present day appears to be designed to fit a man to take pleasure in his own thoughts and musings, and in mental exercise in languages, literature, the higher mathematics, and the problems of physics and natural history. Incidentally his knowledge of these things may not only give him pleasure, but enable him to help others, but the studies are not to be pursued on account of any practical utility which they possess, but for the love of learning and pure science, i. e. for personal gratification of a particular kind. Those who hold these views are apt to consider medicine as a technological matter, which should be left altogether to special schools, because, being practically useful in a commercial sense, the means of teaching it are sure to be provided through commercial interests, just as they are sure to be provided for the teaching of practical engineering. This is far from the old university idea as embodied in the three faculties and four nations of the University of Paris. So far as the interests of the public are concerned, it is only the possession and control of a large amount and variety of clinical material, or of unusually qualified clinical teachers, which makes it the positive duty to use it, or them, for purposes of medical instruction in order to train ordinary general practitioners of medicine. There is no present deficiency in the number of such practitioners, and we certainly have plenty of schools for producing them, so that there is no fear of failure in the supply.

But in medicine as in every other profession, art, or trade, the supply of the best is never too great, and the demand for something better than that which already exists never ceases.

What then does an university, or its medical school, need in order that it may be able to supply the demand for this higher medical education? First,—competent teachers. Second,—suitable buildings, collections, books, and apparatus. Third,—clinical material. To secure and retain these things requires money, and brains to use it. First as to the competent teachers. There are many teachers available—but the number of these who have shown that they are competent for and suited to

positions in a medical school which is to supply the best and something better, is limited—much more so than one who had not tried to find them would suppose, and these few are not seeking engagements. How many anatomists, or physiologists, or pathologists, of the first class, thoroughly trained, authorities in their special fields, capable of increasing knowledge, and with the peculiar gift of ability to teach—do you suppose there are in this country? It is a liberal estimate to say that a dozen of each have thus far given evidence that they exist. And the great clinical teachers in medicine and surgery,—the men who are up to the times in matters of diagnosis, pathology, and therapeutics, and who are also successful teachers both by the spoken and written word—how many such have we—and especially how many such have we who are not fixed and established, so that they may be induced to go to a school which needs them? Such men are either men of genius, and even this boasted nineteenth century has produced them rarely, or they are men of talent made the most of by unflagging industry with special opportunities, and they are also rare. Yet these are the men whom a great university should seek to obtain, and retain, for her faculties. To do this, and to get the best work from such men, is by no means a mere matter of salary, although sufficient salaries must be paid. We have also to consider the buildings, collections, books, and apparatus required, and this is largely a question of money. How much money? What would be the cost of establishing and maintaining a first-class medical school in this country at the present time? Let us suppose that 150 students are to be provided for—that the course of instruction for those coming with a good high school education is to occupy four years, and for those coming with the degree of Bachelor of Arts, and having done at least one year's work in a chemical laboratory and one year's work in a biological laboratory, the course shall occupy three years, that the last year's studies shall be almost exclusively clinical, and that provision is to be made for advanced post graduate work.

We shall want then, practical anatomy rooms for 50 students, a physiological laboratory, a pathological laboratory, a pharmacological laboratory, a laboratory of hygiene, and the means of

clinical teaching, a library and a museum. The days have long gone by when one or two amphitheatres or lecture rooms and a small museum, were all the outfit required for medical teaching. The little amphitheatre of the University of Bologna was sufficient for almost every purpose of medical teaching as that was carried on three hundred years ago, but now the lecture room is the smallest part of the outfit required. In his evidence before the Royal Commission, Professor Lankester stated that to establish such a Medical School at Oxford as he thought desirable, about \$225,000 would be required for buildings in addition to those already existing, and that about \$100,000 a year would be required for running expenses. Professor Billroth estimates that about \$400,000 would be required for buildings for the medical department of a university, exclusive of the building for clinical teaching, which he thinks would cost about as much more,—and that the annual expense would be about \$105,000. He says that these estimates are based on an average standard of efficiency—not the highest—and concludes by saying, “let us hope that a rich man may some day give three millions of dollars to found a school to be devoted to medicine and natural science.”

Perhaps these figures may seem high to you. Yet building is cheaper, and salaries lower in England and in Germany than with us—if only first-class work and first-class men are accepted. To build and equip a laboratory which shall give work room for 75 men, will cost here between \$75,000 and \$100,000. At least four such laboratories are needed by the ideal medical department, besides a building for general lectures, library, etc., which would cost about \$50,000.

It is of course possible to consolidate all these into a single three or four story building and thus save money, especially in cost of ground—but the results are not so good. I am not speaking now of temporary makeshift buildings, but of permanent structures—which, though plain, should not be hideous, and should be thoroughly well built. Where land is abundant and not too dear, it is usually better to construct these laboratories one at a time and endeavor to secure for each, a proper endowment and equipment. The average expenses of each laboratory may be put at \$15,000 per annum. In other words,

it requires about \$400,000 to build, equip, and endow a physiological, pathological, or hygienic laboratory such as is suited to the needs of a first-class university in this country. By paring down in various directions, this sum can be reduced to \$300,000, but not lower without seriously impairing the efficiency of the plan. And in all this I have said nothing of the cost of the means for clinical instruction—which should be borne, in part, at least, by the school, for the simple reason that only by doing this can the school have that control of hospital appointments which is so necessary for its proper work.

Of course every professor who is skilled and energetic, and who is imbued with the true university spirit, has innumerable wants and suggestions which require money to supply and carry out. He wants the new books and journals relating to his specialty, specimens, apparatus, models and illustrations, and if he is at the head of one of the laboratories which I have named, the sum of \$15,000 per annum will be required to pay him and his assistants, and to provide for their needs. All this means that the educating of physicians on this plan will cost the medical department between four and five thousand dollars for each graduate. It will receive from them \$800 to \$1,000 each, and the balance must be made up from subscriptions, appropriations, or endowments. Practically endowment is the only resource.

The student himself has to give four or five years time and labor and four or five thousand dollars to obtain his medical education. For some, this expenditure of time and money will be an excellent investment—for others not, even if they have enough of both to spare for this purpose. After all, the most that the university can do is to afford opportunities for learning, and a certain kind and amount of stimulus to mental work. The professor may declare that he will teach certain branches, but there are some sent to him for instruction who are not teachable, and the only thing he can do is to return them as little damaged as possible.

The number of men for whom it is specially desirable to provide laboratory and other special facilities for original work in physiology, pathology, pharmacology, and hygiene, is limited. There are not a great number of men who have the

desire and the qualifications necessary for this sort of work, and the number of positions in which they can find remunerative employment in devoting themselves to such investigations, is still more limited.

The laboratory facilities in Germany are, as a whole, at present in excess of the number of properly qualified men who can be found to make use of them, although a few are overcrowded.

Advanced work and original investigations cannot, as a rule, be made by undergraduates, if for no other reason than that of lack of time.

Is it advisable that the same medical school shall undertake to furnish such different courses as to provide for all wants—to offer to meet the minimum requirements for the Degree of Doctor of Medicine, as well as the wants of those who demand more advanced and detailed instruction? The answer to this depends largely on the location of the school, and on the means which it can command, especially as regards facilities for hospital and clinical instruction. In any case, its diploma of Doctor of Medicine should have an uniform value, and if it does undertake the double function, the higher education must be largely post-graduate work. It must also be, to a great extent, a voluntary matter on the part of both schools and students.

As indicated at the beginning, this address is not intended to criticize existing medical institutions, or to give specific advice to any college or university. I have simply tried to formulate roughly what seems to be the present ideal of a course of medical education in the minds of many physicians, and then to show what the carrying out of this ideal involves to the schools and to the students.

I believe in ideals—that is in their beauty, and in their utility when they do not dominate a man so as to make him a visionary, or a dangerous crank or fanatic,—but one ideal is often more or less incompatible with another, and all of them must be held subject to the possibilities afforded by surrounding circumstances. But we must not be too skeptical about these possibilities. And we are all directly interested in this matter—every one of us. Every one of this audience will

probably see the time when the knowledge and skill of the physician called in to advise in the calamity which has fallen on him, or his wife, or child, will seem to him of vast importance.

Sometimes he can select his physician—often he cannot—but must rely on the first one who can be found. Hence these discussions about medical education, although chiefly carried on by physicians, because they are most familiar with the difficulties of the subject, should be considered by those who are not physicians quite as much as by those who are, or intend to be. It is a dangerous business, however, for a doctor to discuss other doctors in public. He can make more trouble for himself in less time in this way, than by almost any other method that I know of. Nevertheless, it is my duty to tell you that there is little probability that the ideal facilities for higher medical education, either here or elsewhere, will be furnished by the doctors themselves. There are several reasons for this, but one is sufficient, and that is they have not got the money which I have shown you is necessary to provide and maintain these facilities. Hence, if these ideals are to be realized, the means must be furnished by those who are not members of the medical profession, and it seems to me that this is what will be done.

What is the best way for a university, a real university, to begin this line of work? In most cases I should say by establishing one department at a time on a proper basis. Which departments should be the first to be thus established? Just here is where many of the doctors will begin to differ.

I should say that the first of these departments to be provided for are two which will form the main links in the university bond between the medical and other departments,—covering two branches of knowledge which every university graduate should study somewhat, namely, biology, and hygiene. For the clergyman, the teacher, the journalist, and the sociologist, systematic instruction in these two branches is as desirable as it is for the physician—for the lawyer it will be useful—only the philologist would I excuse entirely from these departments.

Of course, in specifying that they are to teach,—and to teach undergraduates, I do not mean that teaching is to be their sole function. This is not the modern idea of a scientific department of a true university. It is to increase knowledge as well—to provide for the needs of special investigators and seekers who have obtained their elementary training elsewhere.

Let the plans for such a department be well thought out, the expenses carefully estimated—and then bring the matter to the attention of those who have the means to realize this ideal, and sooner or later, it certainly will be realized. I have elsewhere ventured to express my sympathy for two classes of men who have in all ages and in all countries received much disapprobation from philosophers, essayists, and reformers,—namely, rich men, and those who want to be rich.

So far as the wealthy are concerned, there seem to be a good many of them in these latter days who use their stored force to endow universities and professorships, to build libraries and laboratories, and to such let us give due praise and honor.

They may or may not be scientific men, but at all events they make scientific men possible. The unscientific mind has been defined as one which is willing to accept and give opinions without subjecting them to rigid tests. “This is the kind of mind which most of us share with our neighbors. It is because we give and accept opinions without subjecting them to rigid tests” that the sermons of clergymen, the advice of lawyers, and the prescriptions of physicians have a market value.* The unscientific public has its uses, and one of its characteristics is a liking for ideals, some of which it occasionally helps to realize. I can only hope that whenever an American university approves the ideal which I have roughly sketched, this public will see that the means are provided for carrying it out. It may be objected by some that it would be better to help to raise the average standard by endowing chairs in the medical schools in large cities, than to provide special facilities for the use of a limited number. It is quite true that all medical schools should be endowed—and this is coming;—for voluntary associations of physicians—who are

* *Scientific Men and their Duties*, by J. S. Billings, Washington, 1886.

not a wealthy class—cannot afford to compete with endowed schools, when State laws shall come to enforce a higher standard of acquirements. Nevertheless, we need universities properly so-called, as well as colleges and higher schools, and we need university men in the medical profession as well as elsewhere.

I have no fears as to the creation of a medical aristocracy by giving facilities for higher education to those who have the means to avail themselves of them. It is quite true that only a fraction of those who have the means will use these facilities properly—and that there will be a number who have not the means who would make good use of such facilities if they could get them—but these last will not be helped by the total absence of such facilities for anybody. Let us try to give the best minds a chance to obtain the best training—let us try to discover these best minds wherever they may be—and if their owners have not the means to avail themselves of training, let us try to furnish the means—but to do this, one of the first and most essential steps is to provide somewhere the teachers, and the buildings, and apparatus necessary for giving such instruction, and where is a better place to do this than in connection with an university?—or, if you please, in connection with this University?

