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THE CHOICE OF MEDICINE AS A PROFESSION[1]

ONE of the most difficult and important questions for the college student to decide is the question: "What occupation shall I choose when I graduate from college?" It is a question, moreover, which every student ought to decide for himself. Every person's occupation should be suited to his tastes and capabilities and no one can decide whether a given occupation is suited to an individual's tastes and capacities so well as the individual himself. It makes no difference who the student is or what he is; if he is the millionaire's son and foolishly believes he need pursue no occupation at all, or if he is the merchant's son and is destined to fall into some niche prepared for him by parental industry, the truth still remains that if he is to enjoy the best gifts of life he must have occupation and that the occupation chosen should be one in which he can labor happily and usefully. Every student here present should study this question with the conviction that it is in many respects the most important and vital question of his life.

You are all to be congratulated upon the opportunity which is offered you for securing a college education. Whatever you eventually do, whatever occupation you elect to pursue, this college education will stand you in good stead, the higher its value the more wisely you avail yourselves of the opportunity it offers. It is somewhat the fashion nowadays to carp at the so-called liberal education and it is cer-

[1] Lecture delivered November 2, 1909, to the students of Tufts College.

tainly true that it does not accomplish all we have expected of it, a question we can not consider at the present time. Many persons have attempted to say what this same liberal education ought to consist of. In my opinion we may seek far and yet find no better definition than that given by Huxley. He said:

> That man, I think, has had a liberal education who has been so trained in youth that his body is the ready servant of his will, and does with ease and pleasure all the work that, as a mechanism, it is capable of; whose intellect is a cold clear logic engine, with all its parts of equal strength and in smooth working order; ready like a steam engine, to be turned to any kind of work, and spin the gossamers as well as forge the anchors of the mind; whose mind is stored with a knowledge of the great and fundamental truths of nature and the laws of her operations; one who, no stunted ascetic, is full of life and fire, but whose passions are trained to come to heel by a vigorous will, the servant of a tender conscience; who has learned to love all beauty, whether of nature or of art, to hate all vileness, and to respect others as himself.

Such an education as this Tufts College will give you if you do your part; such an education as this will prepare you for any vocation and, better still, will furnish you with the general knowledge which will enable you to select your eventual occupation understandingly. But remember too, as Gibbons says, that: "Every one has two educations, one which he receives from others and one, more important, which he gives himself." Do not neglect this self-education.

The earlier in your college course you are enabled to choose your profession, the better it will be for you, because early decision will enable you to choose your elective studies in such a manner as to bear directly upon your professional work. Mr. Flexner in an article in SCIENCE has said that "statistics roughly compiled seem to indicate that perhaps seventy-five per cent. of the members of the first-year law classes at Columbia and Harvard knew while in college that they would study law afterwards," and this would certainly indicate that an earnest student should be able to make his decision early enough to take advantage of the college offerings. Unfortunately it is the case that many college men form false ideals of what the professions really are. They idealize them from too narrow a view point, and slowly learning that they are different in a practical way from the conceptions they have formed, they become dissatisfied with them. They become, as it were, the round pegs in the square holes. They do not fit. They have chosen professions for which they are unsuited. This idealization of the profession is especially true of those contemplating the study of medicine. If we could look into the different aspirants' minds and see depicted there the different ideals that each one had formed, I am sure we should find a strange and incongruous society of physicians!

But, on the other hand, we should find that all had idealized certain qualities, though in different proportions. One man sees himself as the noted surgeon dashing about the country in his high-power motor, performing miraculous operations with curiously shaped instruments, and reaping a huge harvest of professional fees. Another sees himself the fashionable consultant, the Doctor Firmin, concerning whom Thackeray has told us so much, without whose approval and advice no one who is any one (at least so far as his bank account is concerned), can pass conventionally to the grave. Another pictures himself as the man of science working in his laboratory and discovering the cure of cancer, which shall make him for all time a benefactor of the human race; or he sees himself the special-

ist who knows everything which is known in some small branch of medical knowledge, and who is bending his best endeavors to searching out those secrets of his specialty which are as yet unknown. Or he sees himself as the teacher who is helping others to prepare themselves for the medical profession; or as the army surgeon whose medical knowledge is making possible some vast engineering achievement like the Panama Canal; or the surgeon on the side lines who dashes out to render first aid to the injured gladiator of the football arena, or as the medical expert, clashing swords with the cross-examining attorney in the heated atmosphere of the brain-storm. Or lastly he sees himself as the old-fashioned country doctor, passing his life among the tranquil beauties of nature, and driving in his battered buggy from village to village and from farmhouse to farmhouse, succoring the wounded, tending the sick; alleviating their pain and directing their treatment, a veritable good samaritan doing his best for the good of his fellows; making a sufficient livelihood for his simple wants and happy in the position he has made for himself, a respected councillor and loved friend.

Such are the various aspects in which the physician ordinarily appears to the average lay mind; as the surgeon, the consultant, the specialist, the expert, the official, the teacher, the hygienist and the general practitioner or family physician—or as one combining any or all these functions in varying degree. And such to a certain extent the average physician really is and the diversity of his functions is one of the great attractions of the profession. Ideals of such types blended together represent what the medical profession really is, but by far the preponderating type is the type of the old-fashioned country doctor, the general practitioner whether he be in country or in town.

By far the larger part of the regular medical profession of to-day is the family physician, who pursues medicine for the love he has for it and for the love he bears his fellows. And I say this confidently, knowing them as I do, and speaking concerning them and not as one of them. But I believe it would be hard to make them confess it of themselves, for the twentieth-century physician does not wear his heart upon his sleeve. He is half ashamed of his altruistic tendencies and often tries to hide them under a cloak of simulated roughness. He labors without pay in the hospitals and the slums; he forgets the weariness of his body and the pleasure of its indulgence in his delight in his calling; he is charitable to the poor; considerate of the moderately-well-to-do; he is a friend to those in affliction and is always ready to assume their burdens. If his work is arduous and the rewards are small, if his patients are exacting and his worries are great, he is always buoyed up by the consolation of the scientific interest of his work and by the knowledge of its usefulness. He is to-day a worthy exponent of the highest and noblest of all the professions, "the flower of our civilization," as Robert Louis Stevenson has said, and his duties are often of such a nature as to enable him to touch the heroic.

An incident of this latter nature, relatively so common in medical practise as scarcely to excite comment among physicians, was related to me the other day by a spectator, because of its humorous aspect. The patient, a child, was dying of blood poisoning and it was hoped that by the transfusion of blood from a healthy living person by the new Crile method, its life might be saved. Several members of our pathological department offered their

blood for this purpose and one of them was chosen. Let me remark, in passing, that he had never before seen the child nor its parents. An incision two or three inches long was made in his arm, deep enough to expose his radial artery. The artery was drawn from its sheath, cut squarely across, a tube was inserted in its lumen and the blood from his body permitted to flow into a vein of the unconscious child, the arms of the donor and the recipient being bound closely together. This juxtaposition was continued for twenty minutes or more. The pain to the donor was sickening, a pulsating drag on the incised artery and its moving contact against the sensitive cut skin; the danger was frightful, for let but one of those minute organisms causing the blood poisoning in the child enter into the circulation of the volunteer and his fate was sealed. Anxiously the group of physicians at the bedside watched the increasing pallor of the donor, and the tension became so great that they could hardly bear it. Then one of them (himself a volunteer) remarked: "How does it feel, Larry, to be a martyr?" and in the smile which followed, the situation was saved. And the story was related because of its humor!

To attain success in the practise of medicine a man must possess knowledge to decide and courage to perform combined with a love for truth, honor, justice and purity. Such success means for the most part moderate competency, a large part of the compensation being its scientific interest and the satisfaction experienced by the knowledge of a duty well performed; any one who has experienced the satisfaction of alleviating pain or saving life will not underrate this compensation. It can not be estimated in money terms, but even in this mercantile age the average physician is one who feels more satisfaction in the thought that he has saved the life of a child for its parents, or that of a mother for her children, than would come to him in the enjoyment of the steam yacht of modern high finance. As a money-making profession medicine ranks low. The same capital, industry and time would bring a larger financial return in almost any other calling. At present it may be said of the profession that most of its votaries make a modest income and but few a large income, though it can not be denied that there are a few who enjoy very large incomes derived from the profession of medicine. Any one who estimates the values which money can buy as above those which I have tried to indicate would do well to choose some other profession.

But there are also other advantages in the profession of medicine as a life work.

In the first place it is essentially a gentleman's profession. No one can succeed in it unless he be a gentleman at heart, and this fact, well understood, admits him into the best and pleasantest circles of the social community. He meets people of culture; he associates with educated men and women; with those who make and administer our laws and who direct our charities and educational institutions. Such environment is enormously stimulating to his intellectual life.

In spite of the fact that he is anybody's servant, he is nevertheless his own master. He can arrange his work to suit himself and he submits to no dictation as to how it shall be done. It is he who decides what he shall do and how he shall do it. He is not, as in so many other occupations, the instrument of another's will.

Notwithstanding the fact of the arduousness of his calling, he has, of course, his periods of leisure, and this leisure is at his own disposal, as is the case in few other occupations. His home life is perhaps more complete than is found in any other

occupation excepting the ministry. His reading is broad, and always dealing with new things, and in this way his interests are continually broadening.

Another advantage of his profession is his association with all classes of the community, with men, women and children, whereas in other callings his association is chiefly with men. In other words, he is studying humanity instead of pursuing the elusive dollar.

Mr. Barney, last week, spoke to you of the crowded condition of the profession of the law. The profession of medicine is also crowded. But reviewing the question judicially, so, it seems to me, are all the other professions and callings, this crowding and competition extending into every branch of human activity wherein men and women gain a livelihood. At the present time the only exception to this rule seems to be the general-housework girl!

Speaking of the profession of the law, it is customary to point out to aspirants for legal honors the value of a knowledge of law in other departments of human activity, and students are told of the immense collateral value of such a knowledge in politics; in administrative positions; in banking, real estate, insurance and other occupations; and the implication is made that medicine relates only to the simple practise of medicine. Such a conclusion as this is a greatly mistaken one. Medicine in recent years has experienced such a broadening of its field of usefulness as is the case in no other profession. The foundation of such institutions, the Rockefeller Institute, etc., has created an entirely new field for the physician in the direction of the research worker. Nearly every hospital of note throughout the country has established such laboratories for the study of the causes and prevention of disease, and it is a matter now beginning to be well understood that the duty of the hospital is not only to care for the sick, but to study new methods for the cure and prevention of disease among the well. Such positions as these call for highly trained medical men, and it is a field which will soon be greatly enlarged by the establishment of clinical chemical laboratories as well as those for pathological and bacteriological research.

The great expansion of our life insurance companies has necessitated the employment of a greatly increased number of physicians, and the time is not remote when these great institutions will understand the benefit which will accrue to them in the establishment of research workers who shall demonstrate lines upon which human life may be prolonged.

The increase in the size and number of charitable institutions also calls for a largely increased number of medical attendants and new necessities caused by our extending civilization are daily springing up—such necessities as the supervision of our water supplies; our drainage disposal; physical culture; quarantine regulations and board of health investigations. In fact all the great economic problems of the day are problems which must be largely decided by physicians; as examples of which attention is directed to the supremacy of the Japanese in their struggle against Russia, a supremacy largely due to the health and effectiveness of their troops, as perfected by physicians. And the German exploitation of Africa and the building of our own Panama Canal, were both rendered possible by the conquest of the tropics by the physician.

And we see the trained physician sought out as a teacher of sociology, of psychology, of zoology and physiology and in other fields as yet barely touched by the plough of progress. Such teaching posi-

tions can generally be associated with a position in a hospital or public institution also carrying a small salary, and afford a highly attractive means of gaining a modest livelihood.

The preparation for the practise of medicine calls for four years of hard but interesting work in the medical school, and at least one year's supplementary work in a hospital. The medical school work is elaborately described in all medical school catalogues. To describe it here would be beyond the scope of the present lecture. It might be briefly summed up as a study of the human body in health and disease, and the study of disease with its causes, prevention and treatment. The hospital work means the actual practise of medicine in the hospital under the direction of an experienced physician.

Now the preparation for the medical-school work in the college should in my mind be somewhat along the following lines:

In the first place I would advise every student to do some work every day. The enthusiastic student could do more, and the less enthusiastic less, but I would advise every student to do some, and it is astonishing how much one can accomplish by steady persistent routine work, even if but little time is devoted to it. And I would also advise every student to study some subject thoroughly, the idea being that he should understand what it involves to acquire accurate, precise knowledge; partly that he should have the benefit of the mental training thereof, and partly that he should have the direct benefit of the knowledge itself.

Lord Broughton's ideal of education was to know something of everything and everything of something. Of course that is not practical now-a-days when knowledge is so diverse and extensive, but to know a few subjects pretty well and one subject very well seems to me to be all we have a right to expect from the average college student. To express this in different terms; I mean that it is fair to at least ask of a conscientious student that he should each year receive a good passing mark in all his studies and an A or B in one. Another thing which he should get from this college training is a good physique, for the mere physical work of the study and practise of medicine is such as to demand a strong and vigorous body. Epictetus said that he was a spirit dragging about a corpse! Let no such spirit as this contemplate the study of medicine! And he should have a well-disciplined mind, because the study and practise of medicine call for a high degree of self-control.

Special studies given in the college which will be of inestimable value to him in the medical school are biology (including botany), physics, chemistry, Latin and Greek, English, German and French.

I have placed biology first because I consider it of the first importance, and let me say, in passing, that you, as students of Tufts College, are fortunate in having at the head of your department of biology one of the most distinguished biologists in the country. It is a great privilege to be allowed to sit under this inspiring teacher and at the risk of making myself unpopular with him, I would advise every student in the college, no matter what he intends to be, to take at least one course in biology, that he may learn what science and scientific methods really mean. By studying biology you not only are enabled to form a pretty correct idea as to what the study of medicine is like; to judge whether or no you are likely to make a success of it; you not only familiarize yourselves with the scientific methods of study, cultivating

your powers of observation, of noticing similarities and differences, and of describing what you see, learning to use the scalpel and the microscope; but you also store your mind with a knowledge of facts, processes and methods which will later be of direct value to you in the study of medicine. It would be hard for you to realize how much time is lost in teaching medical students these methods of study which each one of you should acquire without unusual effort in your college course. It is sometimes said of the work in college that it is not so much the things you learn as the knowledge of how to learn which is valuable to the student in after life. I think this statement conveys a false impression. It seems to me that the college student preparing himself for the study of medicine can not only learn how to study to the greatest advantage, but that he can also store his mind with facts and principles which will be of enormous value to him. I believe that the mind should be regarded in part as a storehouse of facts, which can be drawn upon in emergency like a balance in the bank. I have never heard any one question the utility of a bank balance unless perchance it was too large! Another advantage to the medical student of the study of biology in college is that it familiarizes him with animal life in its simplest forms before he begins to study it in its most complex form as evinced in man. By such study he is enabled to take a bird's eye view, as it were, of his subject before he devotes himself to its intimate study. It is like studying the map of a city before we explore the city.

Second to the study of biology, in its importance to the medical student, I should rank physics. No one can properly understand the various processes of the human body who does not possess a knowledge of physics. Everything we do, everything we say, everything we think and everything that goes on within us is due to physical cause, and a knowledge of these underlying physical principles is absolutely essential to a knowledge of medicine. I rank physics second to biology only because some knowledge of physics must of necessity be included in a knowledge of biology.

Third on my list of collateral studies comes chemistry. A knowledge of chemistry is of absolute necessity to the medical student because it deals with the composition of everything he comes in contact with. Before he can study material things to advantage he must know of what they are composed. So important is chemistry that it is taught in the different degrees in every medical school in the country, but it would be of the greatest advantage to the prospective medical student if he could obtain a good general knowledge of organic and inorganic chemistry, including qualitative and quantitative analysis, before he entered the medical school; it would give him extra time for his purely medical studies, and it would enable him to master more easily his biological and medical chemistry. Chemistry, as you know, has a language of its own and a great saving of time is made if the language alone is acquired.

Fourth in importance in the list of collateral studies is Latin, important to medical men because it is the language of the scholar and because medical men should be preeminently scholars. The language of medicine is essentially derived from the classics; every bone and every muscle, every artery and every vein; every nerve and every organ is described in terms of classical derivation. So also are all the drugs, and even our prescriptions are written in Latin, though the Latin in some instances would give Cicero a surprise he

would never recover from! Some knowledge of Latin is essential; a more extended knowledge is highly desirable as an accessory aid to memory.

Advanced English I place fifth in my list, giving it a lower place because a knowledge of English is presupposed. But in including it I mean to advise the more advanced and critical knowledge of the language; a knowledge which permits us to speak and write it fluently and elegantly. A knowledge which has enlarged our vocabulary and has made us widely acquainted with English literature and its development—a knowledge which has developed the reading habit and which makes us familiar with other people's thoughts and habits of thought. If I were to teach English to prospective medical students, I should also lay great stress upon the daily theme upon current events.

German and French I place sixth and seventh in my list as valuable chiefly by enabling us to become conversant with the literature and scientific progress of other nations and peoples. One or more foreign medical journals a week help one amazingly to keep pace with foreign progress. German and French are valuable, too, as enabling us to communicate at first hand with foreigners if we study abroad, or with our foreign patients in practise at home. Few persons, not physicians, realize how greatly our foreign population is increasing. I remember at my clinic one day, when I was late, and four children had been kept for me to examine, that one was an Italian, one a Russian, one a Greek and one a Syrian!

Economics and sociology would come eighth and ninth in the procession, both of immense importance to the medical man; tenth and eleventh, at the risk of being called an iconoclast, I should rank drawing and painting, and shorthand writing, and to round out the dozen, let us add public speaking.

These subjects will not, of course, occupy the student's whole time while in college. Place is left for other elective studies. In these other elective fields the student can roam according to his fancy. The suggested studies form the basis of his work; the supplementary excursions furnish variety. Nothing is lost from the broadening effects of his college course, but much is gained from its concentration.

And now, before I release you for your short respite of well-earned leisure, let me quote to you the words of Kipling to the students in a London Hospital, and say that I need not "stretch your patience by talking to you about the high ideals and lofty ethics of a profession which exacts from its followers the largest responsibility and the highest death rate—for its practitioners—of any profession in the world. If you will let me, I will wish you in your future what all men desire—enough work to do and strength enough to do the work."

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An International Cooperative Investigation on Electrical Standards

The International Electrical Conference, which met in London in October, 1908, passed certain resolutions with regard to electrical units and standards, but left to an international committee, which was established at that time, the duty of completing the specifications for the concrete electrical standards, and of deciding upon a new numerical value for the Weston normal cell which could be adopted internationally.

As is well known, the value for the Clark standard cell (1.434 volts at 15° C.) which was adopted by the Chicago Electrical Congress in 1893, was not accepted by Germany. After further experimental investigations, Germany adopted the value, 1.4328 volts at 15° C. England, America, France and some