

true amniotic cellular tissue has been taken up by the raw surface.

Thus far the conditions treated have not held closely to any one group but have included varicose ulcers, burns, scalds and denudations of traumatic origin.

Ulcers.—These were generally varicose ulcers of the leg of all stages of infection and depth of erosion, and in nearly every instance it was necessary to "clean up" before grafting could be thought of. Iodin or strong solutions of potassium permanganate followed with a wet dressing of mercuric chlorid solution 1:2,000 left on two days generally sufficed to subdue the odor and encourage a more healthy appearing surface. After this procedure it is often found useful to stimulate by rubbing briskly with dry gauze, thus removing all sluggish granulations and detritus. The application of the graft and wax with a thick and smoothly applied outer dressing was usually done as described, but occasionally the wax covering was extended over the entire leg below the knee for the better maintenance of the circulation. While the results were much better than anything seen in our experience with other methods, there was not the diffuse even take over the ulcerated surface which occurred in other cases. There were numerous spots or islands of skin and edges which were healthy and grew in rapidly.

Burns and Scalds.—When all bits of dead skin and all foreign matter had been carefully removed and the tissue applied and left on two days, there was almost without exception an even and diffuse adaptation of the graft. In this group, however, there were only eleven cases; these included all degrees, but none more extensive in area than 9 square inches, approximately, and none situated on the face.

Traumatic Denudation.—One case was treated with so satisfactory a result as to justify a more complete description. In this instance the left hand of a laundry worker was caught in a machine and then quickly pulled out, denuding the palmar aspect of the ring and middle fingers throughout the length of the two terminal phalanges. The raw surfaces were grafted but once and after two days were found diffusely and entirely covered with healthy skin so that no further treatment was necessary other than a dry protective dressing, the skin being yet delicate. This case demonstrates the action of this mode of treatment at its best advantage, there being no unhealthy condition of the underlying tissue. In spite of the fact that there is but one case in this group I am encouraged to believe that the result could not have been obtained in any other way, and that the graft took immediately.

In conclusion it is proper to acknowledge that the experiments have been limited to such cases as herein described and that electric, x-ray or extensive burns of any sort have not been tried.

Should the amniotic graft do as well or nearly as well as true skin, it must commend itself for general use, obviating, as it seems, the necessity of an anesthesia and the production of a secondary wound with no certainty of the outcome for its justification.

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Newspaper Medicine.—The recording by the lay press of a heroic deed or wonderful act on the part of a physician or surgeon is highly desirable, for it increases the respect in which the profession should be held; but there is no excuse for assisting a writer to project a half-baked truth or an incomplete discovery on the necessarily ignorant public.—B. Joseph in *Vermont Med. Monthly*.

MEDICAL EDUCATION AND THE HOSPITAL *

ARTHUR DEAN BEVAN, M.D.

CHICAGO

Mr. President and Members of the Æsculapian Club: I am delighted to have the opportunity of meeting you and honored by the invitation to address you on the subject of medical education and the part the hospital takes or should take in the making of the modern physician. I accept the fact that this invitation is not extended to me as a personal honor, but because for ten years as chairman of the Council on Medical Education of the American Medical Association, I have been on the firing-line in the battle to elevate the standard of medical education in this country; and I take it that you desire to hear the story that these swiftly moving years have written; to hear what has been accomplished, what the existing conditions are, and what still remains to be done in order to place medical education in America on an acceptable basis; and especially what part the hospital will play in this development.

I shall not deal with statistics or with the rehearsal of ancient history, but I shall attempt to draw a rough sketch of medical education as it was when many of us began to study medicine, in order that we may compare it with the opportunities offered and the courses required in our better schools to-day. In the early eighties, a medical student could graduate after attending two courses of lectures of from twenty-six to thirty weeks each. In many schools an additional year's preparatory reading with a preceptor was required, making three years in all, but as a matter of fact the year with the preceptor too often meant little or nothing in the way of medical education. Once in a while, however, this preceptor year under some old Hippocrates of a general practitioner was the best of all and molded and directed the student's medical career. These courses of lectures were repeated year after year, the second year of the course being a repetition of the first. They were given, in the better schools at least, by masters of their subjects, men who knew the medicine of their time and who knew how to impart this knowledge as well as it could be imparted by lectures. Little was done in the way of laboratory work or in the dispensary or hospital. Read the clinical lectures of Trousseau, the lectures of Paget, the surgical pathology of Billroth; and those of you who did not live through this period can form some idea of the character of the medical teaching done in America by their contemporaries, by such men as Samuel D. Gross, Austin Flint, Marion Sims, Henry Bigelow, N. S. Davis, Moses Gunn and a host of others. It has become rather the fashion to belittle the early American medical schools and the medical teachers who taught in them. Surely this is not warranted by the facts. Medicine was not as yet a science. These old masters taught well what was then known. They struggled under a heavy load; many things which seem clear to the first-year medical student to-day were dark, unsolved problems to them. Do not criticize these men; they were great men. Do not criticize their medical schools and their methods of teaching; they were in keeping with the knowledge of their day.

The truth is that in thirty years a revolution has occurred; a new and great science, the science of medicine, has been born; and the change has been so rapid and so great that even those of us who are not old can

* Address before the Æsculapian Club of Harvard University at Boston, Dec. 7, 1912.

reach back and touch the dark days when medicine was not a science. To us the disciples of *Æsculapius*, there has come with this wonderful change a great opportunity and a great responsibility—to develop a scheme of medical education which will keep pace with the rapidly advancing science of medicine.

In the old days when the two- and three-year medical courses consisted almost altogether of didactic lectures, seven to ten men with a lecture room or two could conduct a medical school at little expense and as a profitable business. As a result in this growing country medical schools sprang up wherever the rapidly increasing population offered opportunity. The number of schools organized must have been four or five hundred in all during the course of our history. When the American Medical Association first seriously grappled with the problem of medical education through *THE JOURNAL* of the Association the number of medical schools was 166, about as many as in all the rest of the world. As medicine assumed the dignity of a science it became necessary to put the medical school on a university basis. Since the appointment of the Council on Education a continuous effort has been made by the American Medical Association, largely through publicity in its *JOURNAL*, to better the situation, and with the assistance of the state licensing boards, the association of American Medical Colleges, the Carnegie Foundation and some of the universities, great improvements have been made. The number of medical schools has been cut down from 166 to about 110 and it seems probable that this number will be shortly reduced to 90 or less as the majority of the state licensing boards have this year refused to recognize thirty or more of the poorer schools. It also seems probable that this number will eventually be reduced to about 60 or 70 schools, which will then all be on a sound university basis.

In addition to the reduction in the number of schools other very great advances have been made. Between fifty and sixty schools now require the students to take one or two years of premedical work in physics, chemistry and biology in addition to a four-year high-school course before beginning the study of medicine. The course has been lengthened to four years in all American medical schools and a large proportion of the graduates from our better schools now serve a year or more as hospital interns before beginning the practice of medicine. Except in a few states, graduation from a recognized medical school requiring four years of study is demanded before the applicant can take the examination for license to practice medicine. Strange as it may seem, Massachusetts and Tennessee are about all the territory still left open to the non-graduate. Within a few years, therefore, we shall have in America about sixty or seventy medical schools. The medical student, after leaving high school, will be required to spend one or two years in the study of physics, chemistry and biology in the university, two years in the laboratory, two years in the clinical branches of medicine, and two years as intern—in all six or seven years in preparation for the practice of medicine.

Before leaving the subject of preliminary education I want to criticize one requirement which has been adopted at Harvard, namely, that of a bachelor's degree for admission to the medical school. There is no fair reason why the anomalous American college course should be sandwiched in between the secondary school and the medical department of the university. Life is too short to compel the waste of two or more years in this way. If a bachelor's degree is required and a hospital internship added, the average age of the class at

graduation will be 28 or 29 years—too late an age for a man to begin to try to make a living. In Germany the student begins the study of medicine when he is between 19 and 20 years old; he takes a six-year course, which includes one year in physics, chemistry and biology and one year as an intern in a hospital; he thus secures his license to practice by the time he is 25 or 26 years of age. Twenty-five is a much better age at which to begin the practice of medicine than 28 or 29. I should much prefer to have an intern come on my service in the hospital at 25 than at 29. This is a very serious question and I feel sure from the comparative studies that I have made that it is a mistake to make a bachelor degree requirement. A much better plan is to make one or two years of university science the maximum requirement and even then this should not be generally adopted unless it can be associated with such a saving of time in the secondary school that the average medical student can complete his course by the time he is 25 or 26. I would suggest the adoption at Harvard of the six-year combined course; that is the two-year university science requirement for admission and the intern year as an integral part of your course. Another reason for adopting this plan, and a very strong one, is this: the Harvard medical school should sustain the same relation to New England that the medical department of Berlin does to Prussia or that the medical department of Munich does to Bavaria. It should train the medical men of New England. In order to do this it must be a large medical school and graduate a large number of men. (The Munich school has 2,000 and Berlin 1,800 medical students.) Harvard can never do this with a bachelor requirement which means completion of the medical course at 28. It can do this, however, on the Berlin and Munich basis.

The development of the science of medicine came with the birth of modern pathology and bacteriology and with rapid advances in anatomy, especially in histology and embryology, and in physiology and in the effort, just begun, to make a modern scientific pharmacology. These so-called laboratory branches of medicine have made great strides in the last thirty years. The development of these sciences has made the science of medicine possible. Acknowledging fully the great debt medicine owes to these laboratory branches and without seeking to belittle them in any way, I desire to claim the highest place for clinical medicine itself, the science which utilizes the sciences of anatomy, physiology, pathology, bacteriology, pharmacology, chemistry, physics—in fact, all knowledge—in the effort to seek the cause of disease, to prevent disease, to cure disease, and to relieve the individual of suffering and deformity. I have sometimes heard my laboratory friends say that the only purely scientific side of medicine is the laboratory side, the research side, and once one of them said to me: "What have the clinicians done to compare with the cure of diphtheria by antitoxin?"

What have the clinicians done? Take but a hurried glance at medical history and you will find that the clinicians discovered vaccination, introduced anesthesia, and discovered antiseptic and aseptic surgery; a clinician, Ogston, even discovered the pus microbe; the clinicians have saved thousands of lives by a clinical study of the cause and cure of appendicitis, a work in which your own Reginald Fitz took a leading part. More lives are saved by modern surgery each year in appendix lesions alone than are saved by all the specifics so far discovered by the laboratory workers, including those for diphtheria, cerebrospinal meningitis, and hydrophobia. Think of the thousands of lives that have been saved by the clinician

through modern aseptic surgery each year! As a clinical triumph which compares favorably with the introduction of antitoxin in diphtheria take the saving of 90 per cent. of our cases of general peritonitis early operated on as compared with the former mortality of over 90 per cent.; consider the splendid piece of clinical research work of Kocher in the surgery of the thyroid gland for which he received the Nobel prize; the modern kidney work controlled by the *x*-ray and other scientific means of diagnosis; the modern bone work made possible by the *x*-ray and aseptic surgery; and the stomach work, gall-bladder work, prostate work, etc.; and in the specialties think of the magnificent work that has been done in neurology, pediatrics, eye, ear, nose and throat, dermatology, orthopedics, in fact in every department of clinical medicine.

I do not wish to make any unkind comparisons or to detract in any way from the splendid achievements of our laboratory colleagues. I do want, however, at the beginning of this discussion to insist that the patient, the living, human being with his diseases, is the unit about which the science of medicine is built; that the study of this living, human being is just as scientific as the study of a rabbit or a guinea-pig or a test-tube full of pathogenic germs; that the hospital and dispensary can and should be as scientifically conducted as the teaching laboratory; that clinical research is as scientific as laboratory research; that the highest type, the ultimate object of all medical research is clinical research in which the effort is made to discover the cause and cure of disease. I must insist also that the scheme of medical education must be directed by the medical man, the clinician, assisted by, but not controlled by, his colleagues in anatomy, physiology, pathology and pharmacology.

In the development of a scheme for teaching modern scientific medicine we must as the first essential have the patient and a place to study him in; that means that the medical school must be located in a large center of population and must be built in and around the dispensary and hospital. We must have the necessary facilities to employ the modern refined means of diagnosis; this means clinical laboratories. We must have facilities to study disease in culture and in animals; this means research laboratories. These clinical and research laboratories must be in connection with and a part of our dispensaries and hospitals. In order to prepare our students for the study of clinical medicine, laboratories of anatomy, physiology, pathology and pharmacology must be provided, so far as possible in close contact with the hospital and dispensary. We must have trained clinical and laboratory teachers. One of the great needs in this country is a system such as has been developed in Germany for the training of teachers and research men. German medicine has been made preeminent by the young men from 25 to 35 years of age working as assistants, devoting five, ten or even fifteen of the best years of their lives to one department of medicine, mastering it, developing it, making themselves trained teachers and research men, capable of stepping into the shoes of their chief, or of filling a chair in some other university. We must adopt the same plan in this country.

To my mind the two great problems which now confront us here in America in medical education are: first, the need of a scheme for the development of trained teachers in medicine; and second, the need of the right sort of affiliation between our great hospitals and university medical departments, and the education of hospital trustees to the importance of the educational research functions of the hospital.

The first need as I have already stated I think can best be met by adopting the German plan of having assistants serving many years in one department. This should be applied in both laboratory and clinical departments. It is very desirable that the teacher of anatomy or physiology, pathology, etc., in a medical school should be a man with a complete medical training, including a hospital internship. It is essential for him to have the medical point of view. It is a mistake to put a man direct from the laboratory sciences, no matter how brilliant, into a clinical chair. Laboratory training is most desirable but these men in addition to their laboratory training should serve their five or ten years of apprenticeship as assistants in clinical work.

In solving our second problem, we may again turn to Germany for aid. In this country the medical school has been developed independently of the hospital. In England the medical schools were developed in the hospital, the attending medical men forming themselves into a faculty to teach medicine. In Germany I think we find the right relationship. In no German city is there more than one university and therefore no German city has more than one medical school, as all the German medical schools are medical departments of the twenty German universities. It has not been difficult therefore in Germany to make a close affiliation between the great municipal hospitals and the medical departments of the universities. This is the condition which we should strive to bring about in this country.

This cooperation of the municipal hospital and the general hospital supported by private endowment with the medical department of the university must be brought about in America, and how this is to be done is one of the most vital problems presented at the present time to our great charity hospitals and our universities. The welding of the great charity hospital and the medical department of the university is one of those affiliations which is of great mutual benefit. That such cooperation is of service to both institutions and to the community at large is well shown by a study of the great clinics in the German universities where such combinations exist. We must bring about such a condition of affairs in our great American cities. Wherever I have discussed this matter I have been met by two classes of arguments: one, that on account of our political situation it will never be possible to take our great municipal hospitals out of political control; and another (presented by a group of men, especially laboratory men who know little about clinical medicine and hospital conditions) that the ideal solution would be for each university medical department to have its own university hospital and provide its medical students with patients just as it provides them with test-tubes and guinea-pigs in the laboratory. What is clearly the answer?

This question must be looked at from the broad point of view of the community as a whole; from that point of view it is an economic wrong for the university to conduct a hospital for the sole purpose of teaching and research, and a sociologic crime for the municipality to conduct a hospital as a boarding-house for the care of the sick without any regard for the educational and research functions of the hospital. In the interest of the community, therefore, this union of forces is demanded. The hospital should provide for the care of the sick and the university should provide for the teaching and research function of the great hospital. The two bodies, the administrative and the medical, each have their separate functions to perform. They need not and must not conflict. And it is only by working together in the same

institution that the best results can be obtained. This solution is the only correct one. It must come about because it is the right solution. We must bring about as soon as possible these affiliations between our universities and the great hospitals which are so fortunately situated that they can secure the advantages of such university connection.

The medical school must enter into a partnership arrangement with the hospital and dispensary. In cities where there is but one medical school this will be an easy matter; in cities like New York, where there are several schools which will probably continue, a plan of cooperation must be entered into. Our municipal hospitals must be taken out of politics. The best practical way of meeting this problem is to make a long contract or arrangement between the hospital and the medical school, giving the medical school the right to nominate the attending staff subject to confirmation by the hospital trustees. This medical staff should then have charge of the medical arrangements of the hospital. The salaries of these men should be borne by the university and not the hospital. Special facilities for teaching should be provided by the universities, but the expense of conducting clinical laboratories and research laboratories in the hospitals should be borne by the hospital as a part of its own work. The medical management and the hospital management must work together as partners and not in the position of employees and employer. A small executive body composed of the head of the board of trustees, the hospital superintendent, the head of the training school and two or three medical men should meet often, at least once a month, best at the hospital at lunch-time, and discuss all the important business so that there can be good team-work among the various departments of the hospital. The medical service of course must be continuous and each department should be under a single head, who should also have charge of that particular subject in the college and in the dispensary. Appointments and promotions should be made on the nomination of the president of the university, the dean of the medical school and the head of the department, these of course to be confirmed by the trustees. In each clinical department, the three functions, the teaching of medicine, the training of teachers and research workers, and research itself should be developed. Each man in the department should be doing clinical work, teaching and research work.

In addition to a large general hospital the medical school should make affiliations, as done here at Harvard, with special hospitals, orthopedic, children's, maternity, eye and ear infirmaries, hospitals for infectious diseases, etc. There are two other points which I should like to discuss.

First, who should be appointed as hospital attending men and as clinical teachers?

Second, how should the hospital with its outpatient department be used in teaching medicine?

The answer to the first is that we should appoint the strongest man who can be secured for the place. In regard to this question there has been during the last few years a somewhat heated discussion. Shall we appoint men to our clinical chairs who will devote their entire time to teaching, hospital work and research and who shall do no private practice for fees and whose income shall be limited entirely to the salary of his chair? This position has been under consideration by a number of university authorities and was championed quite strongly by Abraham Flexner in some testimony given before the Royal Commission which recently

investigated the subject of university teaching in London. I think the men who take this view do not fully understand the situation. Flexner, as I understand his testimony, cited, as examples where this was carried out, the clinicians of Johns Hopkins and of the German universities such as Friedrich Müller of Munich. As a matter of fact in neither Germany nor Johns Hopkins are the clinicians restricted in any way in their personal right to employ their medical and surgical skill as they see fit. It is of course unfortunate when, as sometimes happens, a clinician called to a chair in an important university proceeds to capitalize the reputation of the university and makes it pay handsome dividends into his own pocket; but on the other hand it would be unfortunate for American medicine if our great university clinicians were placed in a position where their services were rendered exclusively to the poor, and the well-to-do were deprived of them. Here again we must turn to Germany as a model. I am quite willing to accept Friedrich Müller as an example to be followed here. Müller himself does not think that it would be well to deprive the clinical teacher of the right and opportunity to do a limited amount of private practice. He believes that the university teaching and hospital and research work should have the first call on the teacher's time and that he should devote the greater part of his hours and energy to these. On the other hand he feels that to deprive the clinical teacher of the right to practice would separate him from the medical profession, and he would soon lose the broad point of view of medicine so necessary in one who is training medical practitioners.

I feel that it would be a very great mistake to put our clinicians on a rigid salaried basis and divorce them from the practice of medicine. It would fill our university chairs with mediocre men and deprive the medical school of the services of the best brains in clinical work. Besides it is not necessary, in order to insure the best clinical teaching and research work, to deprive the clinician of his right to charge for his services. Make provision in the teaching hospital so that the head of the clinical department can have a consulting room and a few private rooms. Let him take care of his private cases with the same team and laboratory with which he does his charity work. A man who pays a fee for an operation or a consultation is just as valuable a unit in a clinical research as the charity patient. It is unfortunately true that in this country we have not as yet developed the right type of clinical teacher in our medical schools. We should do as they do in Germany: fill the clinical chairs with men who are university professors, and who will devote the necessary time to teaching and research. In addition to the clinical teachers of the university type the medical school should utilize as extramural instructors the well-trained clinicians with good hospital and dispensary appointments in outside institutions.

How should we use the hospital and dispensary for clinical teaching? In the present period of reorganization of medical teaching in this country there is a tendency to try out a number of different plans, and we have naturally turned to Germany and Great Britain for models and have tried out some original ideas of our own. I do not think that we could do better than adopt the general plan of the German university medical school, which so far is the best that has been developed. It is not perfect and I think we can improve on it in several particulars, especially in better supervision of the students and in the far greater value of the intern year in America as compared with the present compulsory hospital year in Germany. The hospital year has not been

satisfactory in Germany so far because the permanent assistant has crowded out the intern and given him no opportunity. In the ideal seven-year course in medicine which will shortly be the generally adopted medical course in this country, four years will be devoted to physics, chemistry, biology, anatomy, physiology, pathology and pharmacology, and three to clinical medicine, the first two in the medical school, the last in internship in the hospital. How shall we handle these three clinical years?

From my study of this subject during the last ten years I have been forced to the conclusion that there is little place for a scheme of elective studies in the undergraduate medical course. The medical man, no matter whether he is to be a general practitioner, a specialist, a medical teacher or a medical research man, must have as a foundation to build on at the very least that general knowledge of the sciences which can be obtained in the limited time of the medical course. The time is so short, there is so much to learn, that if he makes an attempt to specialize he necessarily neglects some phase which is essential to a well-rounded view of the entire subject.

First, in these clinical years provision should be made to continue the studies of anatomy, physiology, pathology and pharmacology as applied to clinical medicine, as well as for taking up the purely clinical subjects. The method of dismissing these subjects after a term or two of work is a great and serious mistake. The fundamental sciences on which medicine is based should in some form be carried throughout the entire course. In this way much better team work can be done between the physiologist, for instance, and the teacher of clinical medicine and surgery. Possibly I can best illustrate my conception of the clinical course by outlining the clinical work in the department of surgery with which I am most familiar.

In the third and fourth years of the medical college course proper there can be fairly assigned to surgery from five hundred to six hundred hours, that is from two hundred and fifty to three hundred hours each year. How can this amount of time be best employed? The ground that must be covered includes courses on surgical anatomy, surgical pathology or principles of surgery; regional surgery, including the surgery of the head, neck, thorax, abdomen and extremities; operative surgery on the cadaver and animals; orthopedic surgery, genitourinary surgery, dispensary clinics, large amphitheater demonstration clinics and small ward hospital clinics. In passing let me say a word in defence of the amphitheater clinic which has lately been criticized and in some schools done away with. I believe that here as in Germany we must retain the large amphitheater teaching clinic of the chief as the back-bone of each clinical department. Visit the teaching clinics of von Eiselsberg, of Garré, of Kocher, of Krause, of Müller and you will find them the most instructive and the most essential work of their courses. The large amphitheater clinic of the chief must of course be supplemented by small section work done by assistants and by the other courses above outlined. Now when you make provision for all of these courses, what is there left of the five hundred or six hundred hours which have been allotted to the surgical department? Very little time to give a thorough hospital training. The point I want to make is that in a well-organized surgical course there is not enough time in the third and fourth years to give a thorough hospital training to the senior student. The only way out of the difficulty is to add a hospital intern year and make it an integral part of the medical course. There is

another reason, too, why this should be done and a very important one, especially as applied to the department of surgery, and it is this: that the young medical man can in fairness to the patient and to himself handle serious hospital surgical cases only when he has become a part of the medical or surgical machine which is providing proper medical and surgical care for the patient; that is when he is a hospital intern.

The dispensary offers the best opportunity for the clinical teaching of the third and fourth years and it is usually the most neglected. Of the two a complete well-organized teaching dispensary is of more importance to a medical school than the hospital. The dispensary should be under the direct control and management of the chief of the department and his assistants, and if properly utilized it will furnish the bulk of the material needed in undergraduate clinical instruction. I do not wish to belittle in any way the value of the clinical training in the hospital; but the point I desire to make is that the amount of time that can be allotted to hospital work in a well-rounded medical curriculum of four years is so small that at best it is but an introduction to the real hospital work which must follow; that is that of the hospital intern. Is it possible to provide hospital internships for all the graduates in medicine? The Council on Medical Education is now looking into this matter fully and within a year or two will make a report on the relation of the hospitals of this country to medical education, and with special reference to the question of a compulsory intern year.

We can say now, however, that there are more than four thousand hospitals in the United States with more than two hundred and fifty thousand beds. There are at present about four thousand men graduating each year in medicine. Estimating twenty-five patients to each intern, this would make places for ten thousand interns or would furnish the four thousand graduates places in the better 40 per cent. of the hospitals. The requirement for the intern year will come from the state licensing boards. Each medical school should see that a committee on the intern year makes a list of acceptable approved hospitals open to its students and that each student is provided with a hospital appointment; if possible some affiliation between these hospitals and the medical school should be made so that the faculty can keep in touch with the hospital and student and satisfy themselves that the hospital service is of value and that the man has done acceptable work as an intern.

I have had the pleasure and opportunity in the last two days of looking over your medical school, your hospitals and dispensaries. I believe that you have here in Boston an opportunity to develop one of the great medical schools of the world. In order to accomplish this you must build on a broad foundation. The three great functions of a medical school must be recognized as essential and each one properly performed, the making of practitioners of medicine, the production of trained teachers and research men and lastly medical research work itself. Make your school so big and broad that its great opportunities will not be limited to a few men-but will produce well-trained scientific practitioners for the large territory that is within your sphere of influence. Develop a great number of trained teachers and research men who will carry the torch to other institutions and other communities. Seek to master the great unsolved problems of the cause and cure and prevention of disease so that from your laboratories and clinics there may come great medical truths that will prove of service to all mankind.

As individuals and as a university take an active, enthusiastic part in the great progressive movement which has been initiated and is being carried on by the American Medical Association, which has for its purpose the raising of the standards of the profession and the securing to the public the great benefits offered by modern, scientific medicine.

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THE PHILOSOPHY OF MASTICATION

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The chewing of our food is a subject of more or less interest to all of us. Beginning with the precept inculcated in every nursery, we are constantly admonished throughout life that thorough mastication is a prerequisite to health; while a rather recent school of thought contends that the whole process of bodily nutrition is markedly affected by the preliminary treatment of food in the mouth.

Mastication is an entirely voluntary act, while the performance of swallowing is a complicated reflex movement, which may be initiated voluntarily, but is, for the most part, completed independently of the will. Under normal conditions the presence of moist food on the tongue seems essential to the completion of this act, and I might add that a pleasant taste, coupled with a favorable mental attitude, still further facilitates the passage of food down the esophagus.

Too rapid eating, or tachyphagia, is a frequent fault, and has no doubt caused many digestive qualms, besides being the starting-point of many chronic disorders of the alimentary tract. This I admit. What I do *not* admit, however, is the necessity for slow, deliberate and systematic mastication as a *sine qua non* for health in every individual, irrespective of temperament or station in life; nor do I believe it conducive to the best work of the digestive organs that a hard-and-fast rule be enjoined, whereby a certain stated period must be devoted to the mastication of a meal, regardless of the pleasure of the masticator.

From time to time apostles of deliberate mastication, or bradyphagia, have appeared on the horizon, the most prominent of these being Mr. Horace Fletcher, whose work, "The A. B. Z. of Our Nutrition," is so largely devoted to this topic, and who so well pleads its cause, that slow eating has come to be called "fletcherism"; and to chew and insalivate food until it liquefies in the mouth is to "fletcherize" it, according to the nomenclature.

Mr. Fletcher is an American, who, when middle-aged, obese, dyspeptic and discouraged, discovered that by slow and deliberate eating his health improved, and began to elaborate this supposedly new principle. Asserting that he literally chewed himself back into health, he also argued that by the extreme mastication and insalivation of food, appetite is satisfied with a much smaller amount than is ordinarily craved, while at the same time bodily and mental well-being is greatly enhanced.

Mr. Fletcher was really anticipated by Mr. Gladstone, who, as the first advocate of this fad in England, attributed much of his success in public life to the fact that he had always made it a rule to give every tooth a chance, counting thirty-two bites for each morsel.

Under Mr. Fletcher's skilled exploitation, mastication as an art has grown and budded and blossomed until

it has become a new theory, so popular that any one seeking to impede its continued fruition is considered by many either an iconoclast or an ass.

As regards the protein constituents of food, insalivation exerts but little effect. We well know that either the pepsin and hydrochloric acid in the stomach or the trypsin beyond will attend to them, if they are decently comminuted, and their stay in the mouth need be only long enough to originate those psychic impulses which Pawlow has shown us regulate the subsequent flow of digestive juices. Carnivorous animals and reptiles habitually bolt their food, and zoologic history furnishes no record of any psychic forms of dyspepsia in these creatures. The essence of salivary digestion is the transformation of starch into sugar by the action of the ptyalin, and that process, though inaugurated in the mouth, continues until the whole of the stomach contents has become acid. The time of salivary digestion is brief, and to be effectual should be energetic. No more should be expected of it than a preliminary act. The pancreatic and other juices beyond the stomach will care for the starches, if only the psychic centers forward the tidings as received by the gustatory senses.

As to the method or comparative rapidity of chewing, I might say, and say correctly, it is to a great extent temperamental. As some people can perform a stated task, and perform it well, in half the time required by slow-moving individuals; and as some people move quickly, speak quickly and think quickly, so they also chew quickly, but well. By those ardent and strenuous spirits who are happiest when in the busy turmoil of competitive struggle, the act of mastication is naturally performed briskly, but none the less adequately. To that other class, who desire to meander through life in a leisurely way, "far from the madding crowd's ignoble strife," to those semivaletudinarians whose gastronomic powers are under constant mental scrutiny, fletcherism promises the fountain of youth.

Another objection to interminable mastication is the brevity of life. In one place Mr. Fletcher relates that one-fifth of an ounce of a young onion required 722 chews before it disappeared through involuntary swallowing, and Dr. Kellogg mentions a patient who cheerfully spent never less than an hour and a half in masticating his one small daily meal. To insist that busy men, those whose shoulders and minds bear the burdens and cares of government, commerce or literature; whose eager intellects are conquering the earth, the sea and the air—to insist that these should be subjected to a wearisome mastication of inanimate food, is a delusion and a snare, an anachronism in our twentieth-century civilization, and a frittering away of priceless time.

A short while ago there consulted me a cadaverous-looking dyspeptic, who informed me that, up to his retirement from active business five years ago, he had never experienced a digestive discomfort. During his laborious years he ate his breakfast hurriedly, so as to get to the store betimes. His lunch was snatched at a nearby restaurant, while his evening meal was frequently rushed by some important engagement. The finer details of mastication never entered his head, nor did he realize that he was "digging his grave with his teeth," until so informed by an overzealous friend acquired in his new life of leisure. The small seed, once sown, took root in his idle mind, and, with little else to do, he devoted himself assiduously to fletcherizing his food and safeguarding his health. The result of this was a morbid introspection, which transformed a robust, alert business man into a puny, whining invalid, full