

Address.

PROBLEMS IN MEDICAL EDUCATION.¹

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To be present at the opening of this clinical laboratory that you have established, to have the privilege of addressing you on this occasion, is an honor that I deeply appreciate. It is an occasion of congratulation, and you are to be felicitated on having made this most important step towards giving to students an opportunity to acquire knowledge from the patient at first hand.

I do not doubt that this laboratory will stimulate other medical schools to establish similar ones, and hence the occasion is one which concerns the whole profession.

For a number of years I have been interested in medical education and have watched with satisfaction the growth of opinion which is producing change in methods. Today educators are keenly awake to the necessity for improvement in methods of teaching, not alone in medicine but in all knowledge. The Western Reserve University Medical School is known to be actively interested in improvement in methods of education, and it has seemed to me that this occasion lends itself to a consideration not only of the value of clinical laboratories, but of some of the other problems of medical education.

While much has been written on this interesting theme, and good has come from the addresses of Welch, Bowditch, Minot, Cabot, Councilman, Keen and others, yet much work remains to be done.

I shall take it for granted that the end to be attained in a medical school is to "train men for power," as Mr. Eliot has said. How the student shall acquire this education concerns us all. It seems to me that the student in medicine should be trained in the scientific method to acquire definite, accurate knowledge, sound reasoning and the humanitarian sense of the care of the individual. I therefore invite your attention to a few of the problems that have interested me. They are:

- I. The value of experience.
- II. The value of laboratories.
- III. The value of the combination of the laboratory with the patient.
- IV. The position of teachers.
- V. The value of the lecture, recitation, demonstration and sectional teaching.
- VI. The value of extra-mural teaching and graduate teaching.
- VII. The function of a medical school as that of a university of medicine.
- VIII. The curricula of medical schools.

Incidentally there are many aside thoughts that will naturally be presented, and if this consideration leads you to think of these problems I shall be content.

¹An address delivered at the opening of the Clinical Laboratory of the Western Reserve University Medical School at Cleveland, Ohio, on June 12, 1901.

I believe that with truth it may be said that in no country does the individual sick patient receive such personal kindly attention from his physician as in America. It should also be said, I believe, that the patient in this country is often ignorantly and incompetently treated, and this, in part, is due to the character of instruction in some of our medical schools.

Graded instruction in medical schools is only a quarter of a century old, and in only a few of the schools has the importance of giving the student the opportunity to acquire knowledge at first hand been thoroughly recognized. The professional dictum of "I say so" in many schools still holds sway, but fortunately the modern student demands more than to be told opinions; he insists upon knowing, and, where practicable, receiving demonstrable facts. This laudable spirit of knowing for one's self has much to do with the progress of our people, and in medicine it is a force which moves the dead weight of tradition.

The pendulum of agitation is making wide excursions, and the missionary spirit of advance is almost fanatical in its attempt to upset old methods. There is hardly a medical school in this country that is not considering in what way it can improve its methods of teaching.

A new era is at hand. This is dependent upon demands that are made for better care of the sick patient. With the material growth of our country the middle class, who are really the moving force of our land, demand better houses, better food and water, better clothing, and they demand skilled knowledge in the treatment of their ailments. They are no longer content to receive assiduous attentions and to have hope given them. They demand, whenever they can afford it, definite, accurate knowledge of their disease. They appreciate the inestimable benefits of preventive medicine, the value of public sanitary work, and often possess a fairly accurate knowledge of the methods of research in diagnosing disease. This is well shown in the change of public opinion which has occurred towards hospitals, almost within a decade. Today the public know that in the wards of an hospital they will receive the best skilled attention, and do not deem it, as formerly, as next to the poorhouse.

There is, then, both the demand and the desire for medical reform. The intrinsic difficulty in the problem of reform in medical education is the absence of accepted knowledge. Theory in methods and sweeping generalizations are being constantly presented. This condition is not satisfactory. The conservative who has taught for years, who feels that his structure is being shaken to the foundation, and the radical, who believes that knowledge is only to be acquired by the adoption of his method, clash.

I. THE VALUE OF EXPERIENCE.

Perhaps the most valuable method of acquiring knowledge is by personal experience. To bring a student, under supervision, actually in contact with a sick patient, to have him establish the

diagnosis of the case, to watch its progress, to treat the patient, and to know the solution of the problem, is undoubtedly a very valuable method of instruction. The adage that "experience is the best teacher" is so generally accepted that it seems superfluous to question its value, yet if all knowledge were obtained by experience the progress of the world would be very limited. If we were forced to learn all things for ourselves and not to benefit by the experience of others as recorded in literature, progress would be limited essentially to a generation. To learn all things by experience is wasteful of time and opportunity. The teacher can show the student short cuts to knowledge. He can point out to him methods which are of value and methods which are useless, and above all can inspire him by force of word and example with a love of knowledge. So we must accept that experience is not the only method of obtaining knowledge.

The practitioner of medicine is an autocrat; his dicta are received in the sick room as the truth, and from his environment he is not forced to know his facts.

It is rare that a practitioner in observing a patient has the opportunity of proving his conclusions. He deals with chance, he does not solve nature's riddles, and this dealing constantly with clinical problems which are never solved leads, unless he has been carefully trained in scientific method, away from controlled, accurate observation.

A deal is said of the judgment of the practitioner which can only be gained by long experience. After all, this experience is of value solely where the facts are known in an individual case. The only method of acquiring the habit of forming accurate judgment is, as Spencer² has said: "The constant habit of drawing conclusions from data, and then of verifying those conclusions by observation and experiment, can alone give the power of judging correctly."

How important it is, then, that the foundation knowledge of a student of medicine shall be firmly laid by the scientific method as taught in laboratories for research work. There every fact is verified, and the student will form the habit of scientific thought.

Obviously the teaching of medicine should be as a science, not as an art, but until the truth is accepted of Minot's statement³ that "Medicine is one department of applied biology, just as dyeing is one department of applied chemistry, or electric lighting a department of applied physics," the art of the practitioner which alleviates suffering must be taught. This art of the practitioner consists of the empiricism of experience rigidly controlled by scientific thought.

This habit of scientific thought is greatly to be desired, and will go far to disarm the criticisms that are justly made of the impractical charac-

ter of some medical men. Bowditch⁴ says that "highly educated men have often been found singularly lacking in mental balance. Schools for the inculcation of common sense have never yet been established." Our countryman, the philosopher, Mr. Dooley, says that "ye can lade a man up to th' university, but ye can't make him think."

II. THE VALUE OF LABORATORIES.

At the present time it seems as if the progress in medicine were largely to be made by research work done in laboratories. Laboratory men have come to the front, and the work that they have done gives them the right to declare that they are carrying forward knowledge in the science of medicine. The influence of laboratory men is now being felt in all science, and in medicine it is rightly the force which is obliging men to revise medical education. The important advances in science have almost invariably been made by men who observed, experimented and reasoned.

Students who are taught in laboratories are sometimes inspired with the belief that only from research work in laboratories comes knowledge, and there is danger that the coming generation of medical men will be unduly impressed with the importance of abstract scientific facts. The danger from laboratory work alone is that students will know only part of the truth, that their facts will be disconnected and not a part of a common whole. To know that a streptococcus infection is present, and to fail to appreciate the resisting power of the patient, is defective knowledge.

Unfortunately, many of the so-called facts which have come from a laboratory of medical research have been short-lived, and the lack of caution on the part of laboratory men in the exploitation of their alleged facts has rightly made many men cautious in accepting their findings.

The spirit which stimulates laboratory men to contribute their bit of accurate observation to the wealth of scientific knowledge is worthy of the highest commendation, but at times it has seemed as if they would be better fitted for their work in advancing that knowledge if a broader and more comprehensive view of the facts presented were taken by them.

How often we see in man a high degree of skill developed in a special line at the expense of broad comprehension. Unless this tendency to narrowing is constantly combated by the special worker, it becomes a dominant force.

The research man in medicine is to exist as a seeker of abstract facts. He will work in special laboratories in cloister-like seclusion, and from him will come knowledge. The future practitioner of medicine, however, will have his foundations laid in laboratories, and will carry the training he has there received to the individual patient.

III. THE VALUE OF THE COMBINATION OF LABORATORIES AND CLINICAL MATERIAL.

A clinical laboratory, it seems to me, has the following advantages:

(1) The habit which the student will form of examining clinical products in each individual

² Herbert Spencer: Education.

³ Knowledge and Practice: Science, U. S., July 7, 1899, vol. x, No. 236, pp. 1-11.

⁴ The Medical School of the Future. Transactions of the Congress of American Physicians and Surgeons, 1900, vol. v.

patient as he presents himself. I fear that, in many instances in the actual practice of medicine, the lack of training and facility in examining sputa, the urine or the contents of the stomach, has much to do with the lack of precision in diagnosis and treatment.

(2) The training of students to apply their abstract scientific knowledge to the concrete example of a patient.

(3) The stimulus to acquire knowledge at first hand, which will not alone be felt in his laboratory work but in his clinical work in the wards and out-patient departments of an hospital. In after life this will lead him to be not alone thorough in his examination of patients, not to rest content with a "snap diagnosis," but to search until the problem is solved and the patient relieved.

(4) The impetus it will give to research work. At present research work is largely being done in laboratories, but the scientific method of work having been acquired in laboratories must, of necessity, be carried into the wards of an hospital, which is, after all, a great laboratory for observing nature's processes. Control experiments cannot be carried out on living patients, but much work of scientific value has been, and can be, done by the clinician, who does wrong to accept that the laboratory man alone can make advance in medicine.

This clinical laboratory, which you have established through the munificence of Messrs. John Hartness Brown and Samuel M. Mather, it seems to me, furnishes the link that binds the application of abstract science to the patient. It places on a definite laboratory basis the practical branches of medicine and surgery. In this laboratory the student will not alone have the keen pleasure that comes to a special worker of controlling absolutely one's work at a laboratory desk, but in addition he will have the controlling influence of the attrition of dealing with living patients. To see a patient, to examine him, to bring material to this laboratory, and at his own desk to apply the tests which will determine the diagnosis of the disease, connecting the abstract knowledge of the laboratory with the applied knowledge of practical work, is a great step.

Occasionally and rarely will come forward a man fitted to do original work. The spirit of original investigation, properly conducted, is given to but few men. These men should be encouraged to pursue their work, and there is perhaps nothing more encouraging than to see men of great wealth establishing, and, let me add, endowing, laboratories for medical research work.

IV. THE POSITION OF TEACHERS.

The position and compensation of the teacher of medicine is not satisfactory. At present the clinician who holds a position as a teacher is tacitly told that he is in a position of such prominence that the prestige of his position will give him a large consulting practice. Hence his salary is relatively a bagatelle. Naturally, being a wise man, he arranges his life somewhat as follows: (1)

His private practice; (2) his hospital work; and (3) and last, his duties as a teacher. Not until boards of trustees of medical schools make a teaching position the principal object of a man's life, and compensate him for doing the work, will medical schools have trained teachers.

The fact that laboratory men, as a rule, regard their position in a school as of prime importance is one of the reasons why advance in methods of teaching has come from them rather than from clinical teachers, who, at best, consider their teaching position as only an incident in their careers. Medical education should command the first and best interests of the teacher, and until this is recognized progress in clinical teaching will advance haltingly.

V. THE VALUE OF THE LECTURE, RECITATION, DEMONSTRATION AND SECTIONAL TEACHING

is open to argument. I believe that they are all of value, under certain conditions, but that their real position is undetermined. They are on trial. The present tendency in many schools is to adopt sectional teaching and to give up the lecture entirely. There are certain subjects that can and always will be best presented by a lecture; for example, the unusual diseases, such as beriberi, hydrophobia, tetanus, etc., it will often be necessary to present to students by a lecture. One thing that is perfectly plain is, that the teacher who does not believe that he can or should lecture successfully never will.

The clinic must always be of great value, for it gives an opportunity for the teacher to present a series of cases, either in contrast one with the other, or different phases or epochs of the same disease.

VI. THE VALUE OF EXTRAMURAL TEACHING AND GRADUATE TEACHING.

Extramural teaching should be carefully tried in all large centres of population. From the ranks of these teachers must come those who will be of real value to medical education.

Graduate instruction is at present too commercial and not sufficiently scientific. The physician who comes to a school for therapeutic tips, latest dodges in operative technique, and who goes back to his practice with a reputation of having the latest scientific facts, is not to be encouraged. Graduate instruction should be planned on such lines that the practitioner who desires real scientific knowledge shall be able in the shortest possible time to thoroughly acquire real knowledge.

VII. THE FUNCTION OF A MEDICAL SCHOOL THAT OF A UNIVERSITY OF MEDICINE.

Formerly the training of a medical school fitted men, as best it could, for one thing,—the practice of medicine. Today a school of medicine should fit students for at least three definite lines of work: (1) The general practice of medicine; (2) the practice of a special branch of medicine; (3) for work in biology as applied to medicine.

Three is often spoken of as synonymous with "scientific medicine," but I prefer to keep the phrase "scientific medicine" in its legitimate place, as including scientific work in both laboratory and clinical work. Excellent scientific work has been done by clinicians, but of late some of the laboratory men have come to considering themselves the only workers in scientific medicine.

This new demand upon a medical school removes it from the college class and brings it into a university position. A university of medicine, if not in name, at least in fact, is not far distant, and from it should come knowledge. To quote from President Eliot's⁵ essay: "Universities have three principal direct functions. In the first place, they teach; secondly, they accumulate great stores of acquired and systematized knowledge in the form of books and collections; thirdly, they investigate, or, in other words, they seek to push out a little beyond the present limits of knowledge, and learn, year after year, day after day, some new truth. They are teachers, storehouses and searchers for truth." The teacher, museums and the research scholar all exist in the modern medical school.

Granting that there are at least three principal lines of work which graduates of medicine are to do, why not establish a common standard of fitness for all, and then allow each group of men to develop along their chosen line of work? That the requirements for a degree should be the same for these different lines of work seems hardly necessary, and a judicious elective system is much to be desired.

The pressure of modern life makes success imperative; attainment of living results alone justifies our existence. Early specialization and material gain are the spirit of the times. The evil results of these high-pressure forces can be guarded against by taking care that the student's foundation is sufficiently broad and comprehensive, that it is the scientific method of education,—namely, observation, experimentation and reasoning.

With the growth of medical knowledge and with the keen demand for special training which gives success to a practitioner, it becomes obvious that the time is not far distant when the student must be trained in a different manner from what he is in medical schools at present. Either the length of study must be increased to five, or even six, years in order that time shall be given for acquiring special knowledge in the work the student is to carry out in life, or the requirements of each of the individual branches taught in medical schools must be reduced to a minimum, and the latter part of the course be devoted entirely to elective or optional work on the part of the student.

Granting the general principle that there are different lines of work for which a medical student must be prepared, the establishment of a minimum required course of instruction, with electives, becomes necessary. Any student who

⁵ The Aims of Higher Education, Educational Reform, p. 225.

possesses a degree in arts, letters or sciences should be made a well-grounded man in three years. He should not be given a degree in three years, but his required instruction should cease at the end of three years, and this should be followed by a fourth year of electives. But, in order to accomplish this, the curriculum must be arranged as a whole and not dominated by the enthusiasm of the head of one or more departments. How shall this be accomplished? One way would be for the head of each department to submit the minimum number of hours of instruction that he considers necessary in his subject. These submitted minimum hours of instruction could then be given to a judiciously selected dooming committee, who should scale down the number of hours in each of the different departments so that they can be fitted in to a given length of time. The subjects required would naturally be reduced to the minimum.

Accepting for the time that three years' required instruction is sufficient, the fourth year would be devoted entirely to elective and optional courses; then a student would take elective or optional courses in the lines of work that he expected to be called on most to do. If, for example, he were going to be a general practitioner he would devote his time to pathology, medicine, surgery, gynecology, pediatrics, etc., *ad lib.* If he were to be a surgeon he would take electives in anatomy, pathology, medicine and surgery, etc. If he were to be a public sanitarian a still different line of work would be adopted, and if he were going into scientific medicine he could take up his life work comprehensively grounded in general medicine.

Spencer⁶ says that, "Before there can be a rational curriculum, we must settle which things it most concerns us to know; or, to use a word of Bacon's,—now unfortunately obsolete,—the relative value of knowledges." "Had we time to master all subjects we need not be particular. To quote the old song:

" 'Could a man be secure
That his days would endure
As of old; for a thousand long years,—
What things might he know,
What deeds might he do!
And all without hurry or care.'

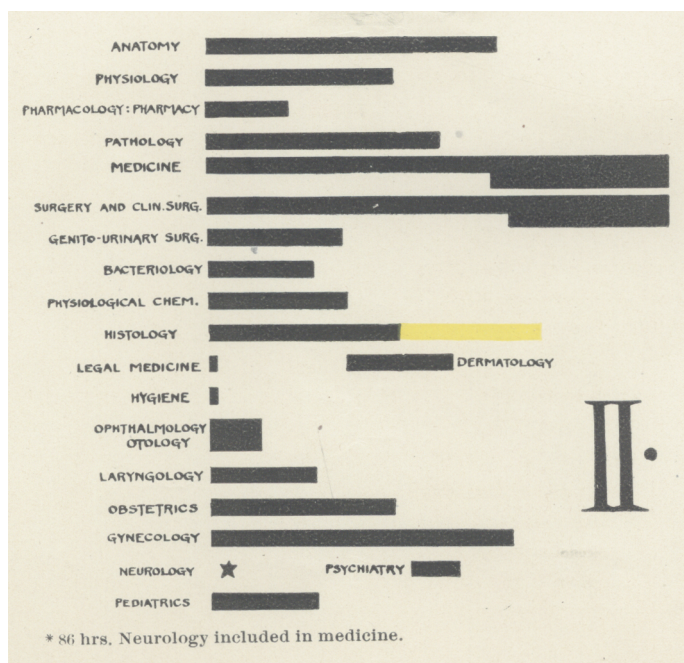
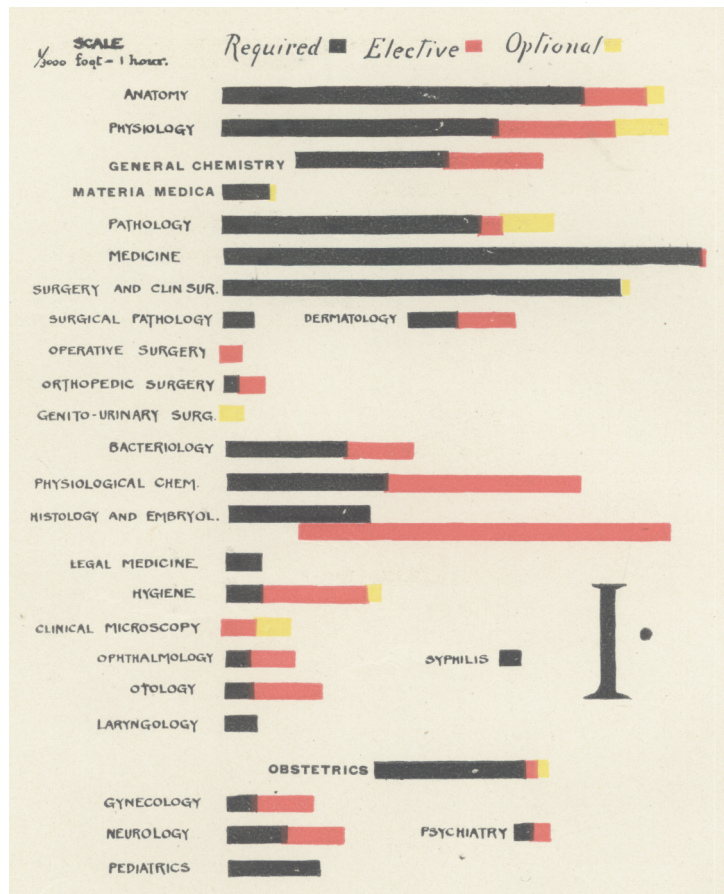
"But we that have but span-long lives must ever bear in mind our limited time for acquisition."

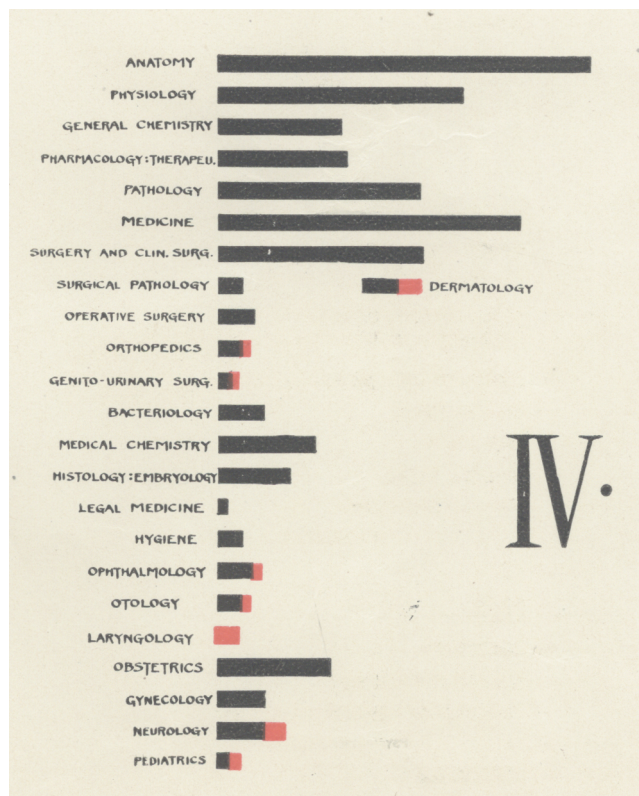
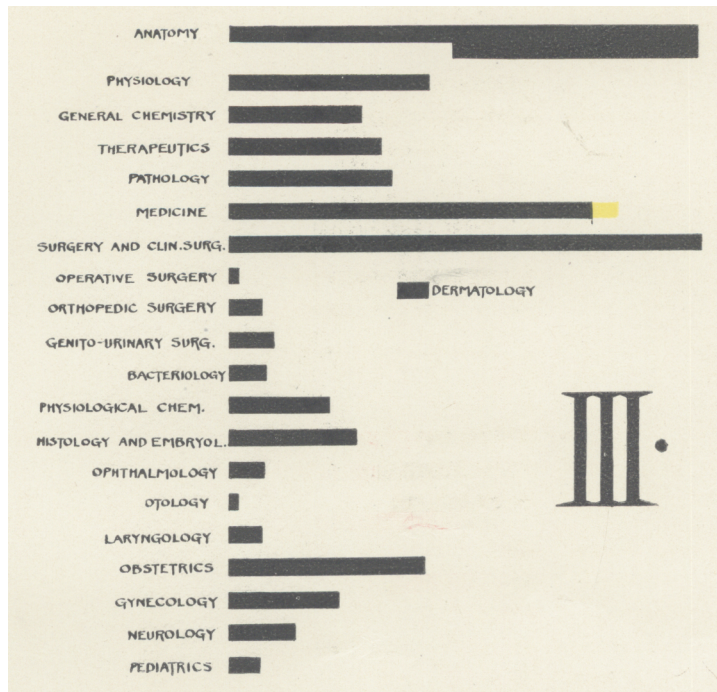
VIII. THE CURRICULA OF MEDICAL SCHOOLS.

What a student of medicine shall be taught is a mooted question. In order that I might know the present conditions of medical instruction I turned to the curricula of many of the medical schools of the country, and, at my request, Drs. F. J. Cotton and H. S. Warren have formulated and placed in graphic diagrams the hours of instruction in four of the principal medical schools.

In the accompanying diagrams you will see the

⁶ Herbert Spencer: Education.





number of hours devoted to each branch of medicine, as set forth in the published statements of the schools. The hours of instruction in these diagrams are represented as follows: Required subjects are in black; elective subjects, counting for a degree, are in red; optional subjects are in yellow.

Some of the published statements of medical schools do not give sufficient information to allow one to determine the amount of time given to a subject.

The advantage of presenting these diagrams is that one is led to consider the whole curriculum and not alone the subject that one is interested in. I, therefore, beg your consideration of them as a whole. It will be unnecessary to mention the names of the schools; I shall call them Schools No. 1, 2, 3 and 4.

Perhaps the most striking difference in these schools is the absence of elective and optional courses in Schools 2, 3 and 4. The initiative force, enterprise and enthusiasm of the head of the department is shown in many of the black lines. For example, in School No. 3 it will be noticed that anatomy occupies a very large number of hours, and the school could be justly termed a school of anatomy rather than a medical school; whereas, School No. 2 can properly be termed a school of medicine and of surgery, and possibly of gynecology. Again, School No. 4 could be called a school of anatomy rather than one of medicine and of surgery.

If the hours of instruction in so-termed general chemistry and physiological chemistry in School 1 be added together, they will nearly equal the total time devoted to medicine. Materia medica and gynecology occupy a relatively small position in School No. 1. The number of hours given to minor departments in all the schools is apparently largely dependent upon the enterprise and force of the head of the department.

It is obviously unjust to bring all subjects to be taught down to the one standard of the number of hours devoted to the subject. The intrinsic difficulties of a subject may demand a comparatively large number of hours to present it. Then, again, the hours spent in the laboratory courses are of more than the apparent value in that the student is drilled to use scientific methods. It would be of great benefit if one could represent the values of the instruction by degrees of black, red or yellow. But who could determine the values?

In some instances it was impossible to determine the exact number of hours given, but, as a whole, the diagrams represent, with fair accuracy, the curricula of four of the principal schools of the country.

A closer comparative analysis of these tables can be made by anyone interested in the subject, and many deductions can be made, some of which will be of value.

Incidentally I have alluded to the quality of instruction as given in different courses presented in a curriculum. How can this quality be im-

proved? The stimulus of competition between different instructors in the different schools of this country should be encouraged. The custom of calling laboratory men from one school to the other is fairly well established, but the calling of clinical men from one school to the other is hampered by the lack of control of clinical material by medical schools.

This difficulty is gradually being done away with, and the day is not far distant when young men who are to be teachers of medicine will be called to clinical as well as laboratory positions. Even without the control of clinical and laboratory material a step can be made to secure competition, the life of progress.

If the principal medical schools would co-operate by requesting the heads of their respective departments to confer and to establish a uniform minimum required standard of instruction in their respective departments, such a standard curriculum could be established.

A student might take his first year under the best teachers in one school, his second year at perhaps the same or another school, and his third year at still another school. If an excellent course in anatomy were being given in School X, in surgery there might be an indifferent course being given. If the students left the school where a weak course in any subject were being given, it would quickly act as a healthy stimulus to improvement.

It is justly considered that the past century was the era of the birth of personal liberty; the coming century is to be the era of co-operation of like enterprises. Medical schools have a common purpose; they are rapidly becoming a part of universities, and co-operation in establishing curricula is desirable.

The economy of time of the medical student has not been seriously considered. It is an imperative need — one that must soon be met. Those who are in charge of the problem of education must carefully consider the economics of life. It is their duty to minimize the amount of time required by the student to attain a competent knowledge of medicine and to accord to him early electives.

To summarize: (1) Every school of medicine should establish a curriculum which is not dependent upon the wish of the head of each department, but is planned for the good of the student in medicine. (2) It is desirable that every medical school should establish in each of its departments a minimum uniform required course of instruction for the average student. (3) During the fourth year of instruction the work should be essentially elective and optional in order that students may prepare themselves for the special line of work that they are to engage in. (4) Improvement in methods of instruction can best be secured by active competition. This can be attained by the medical schools of this country adopting a standard of minimum required work. At what period this minimum required work should cease is open to argument.