

**ASSOCIATION OF
AMERICAN MEDICAL
COLLEGES**



**PROCEEDINGS OF THE THIRTY-SIXTH
ANNUAL MEETING, HELD AT CHARLESTON,
SOUTH CAROLINA, OCTOBER 26, 27, 28, 1925**

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ADDRESS OF PRESIDENT

SHOULD THE MEDICAL CURRICULUM BE IMPORTANTLY RECAST?

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If one is inclined to be critical of the present state of the curriculum in medicine and, particularly, if one tends to be iconoclastic, it is but respectable to acknowledge the debt which we owe to those who have brought medical education to its present high state in this country. We are inclined to complain, and with reason, of the overcrowded condition of the curriculum, of the rigidity which arises from regulation, rule and law, but it may be doubted whether the present position could have been achieved without imposing these restrictions. All of them were certainly enacted in the desire to elevate a previously low standard, and there can be no denying that they have had that effect. It may even be doubted whether a situation as satisfactory could have been achieved by any less violent methods.

Our admiration, however, for those who have done such constructive work should not restrain us unduly in our desire to continue their good work and play our part in putting and maintaining medical education upon a high plane. Many of the changes which have been wrought in the past have been made as the result of experience with medical education in other countries. At an earlier day the largest influence was a reflection of medical education in Great Britain; at a later period, a reflection of the development of medical education in Germany. Both of these systems of thought have contributed importantly to the curriculum as it at present stands but there may be reasonable doubt whether systems which have proved satisfactory and have developed steadily in other countries can be grafted in large measure upon our educational system. Certainly there is an attitude of mind in regard to general education which is quite peculiar to this country. In many respects we have departed violently

from the existing scheme of things in the older world and we shall, I think, do well to take stock of the present condition of our educational plan in medicine with a view to seeing whether we have not been accepting as satisfactory methods developed elsewhere and assuming that they could be utilized successfully by us.

I believe it is not presumptuous to at least raise the question whether this is not a particularly favorable time to survey the field and consider whether the time has not come for the definite development of a plan in tune with our intellectual and educational ideals. It is with this in view that I shall attempt a survey which will include much that is old and stale to many of you.

END TO BE SOUGHT

Perhaps the best gauge of any system of education is whether it is producing the results desired. At the outset, however, we must decide what is the result which we desire. It may perhaps be questioned if we have at all times kept before us the end in view and have not occasionally become confused between method and result. There will probably be no disagreement with the broad, and therefore inaccurate statement, that the aim of medical education is to turn out men capable of developing into wise general practitioners. The possibility that we desire to develop specialists would doubtless be dismissed with contempt though the charge has been made that this is in fact the result. But there is a certain vagueness about the term "general practitioner" which will perhaps bear some analysis. Clearly the general practitioner as we have learned to know him by his great works in the past has been something more than a skillful purveyor of the science and the art of medicine. Those of the profession whom the community has come to respect highly have been people of broad and catholic view, sound judges in many fields other than medicine and wise counselors upon many conditions which science, at least, has yet failed to label. The position which the doctor has occupied in the community has been importantly due to the fact that he was a citizen of above the average calibre. Any scheme of education which fails to provide possibilities of growth and perhaps one which does not foster them is likely to fail of its object, no matter how skillfully it deals with the special problems

of disease. Clearly the ideal of the medical graduate should be an educated man accepting the broadest connotation of this phrase. The position which the physician must occupy in the community if he is to hold his place, is one of unusual responsibility requiring beyond the field of education high moral qualities which come as a rule only with reasonable maturity of growth.

Thus the education of the physician must be far broader than his training in medicine and it appears to me to follow from this as a corollary that the time element in medical education will necessarily be considerable. It is probably true that the amount of medical knowledge which is required by a satisfactory practitioner can be compressed into a smaller space, but it may fairly be doubted whether such compression would not be at the expense of the development of the individual in ways which only time can give. I, therefore, incline to an abiding skepticism in regard to any attempts to importantly curtail the time now involved.

But any attempt to specify the nature of the product of medical education must take into account not only what has proved desirable in the past but what is likely to suit the rather rapidly changing conditions of the present day. It is fairly evident that the supply of, and I suspect requirement for, the general practitioner as he existed a generation ago is rather rapidly falling off; that there is an economic element in this change I shrewdly suspect. I incline to doubt whether the product which was satisfactory twenty years ago will be able to cope with the conditions of the future. If this type of physician is to maintain his place in our social development, a somewhat different equipment will be necessary. The rapid growth of knowledge in the field of public health and preventive medicine has thrown upon the general practitioner a requirement which has not existed even in the comparative recent past. If he is to be in fact the confidential adviser of the community, he must do so far more in the field of prevention and somewhat less in the field of cure. One suspects, therefore, that the modern product must be far better equipped in this respect than was his predecessor. Again, with the increasing complexity of economic and social conditions, a far wider knowledge of economics and sociology will be required. In a simpler society the play of these forces was relatively limited. Today an important share of the problems which come to the

physician have their background in economic and social conditions with which he must be familiar. It is even possible that a broader knowledge of history will be required if he is to judge with accuracy the background of the ills upon which he is asked to pass judgment. We shall, I think, do well to consider seriously whether the physician of the next generation will not require a far broader equipment in these fields than has been necessary in the past or is being offered at the present time.

But before leaving this question of specifying the product, it may be worth while to raise the question whether or not the physician of the future can in fact properly be described as a general practitioner at all. In this day of rapid economic change, an outstanding tendency of which is specialization and consolidation, we observe the development of groups as a substitute for the individual of a previous age. "Group medicine" in all its various forms is clearly an attempt to substitute the judgment of several, each reasonably expert in his field, for the necessarily more dilute wisdom of the individual. Now it is just conceivable that a generation hence the "group" will have taken the place of the individual; that the general practitioner will have passed into history and that any scheme which we may devise for turning out a well rounded individual who will attempt in his own person to be the purveyor of advice in the field of medicine will prove to have been a mistake. It is as yet too early to say whether this outstanding tendency of recent years will become the clear objective of the immediate future but it should, I think, be entertained as a possibility, perhaps not too remote.

But excluding this, for the moment, from consideration, we may properly assume that the product of the school for which we now attempt to lay out a plan must be a person of broad education if anything, more rather than less than has been given even in the recent past; that he must know more history, sociology, philosophy, economics. It would, perhaps, be presumptuous to suggest to this gathering that these subjects are at times almost as important to the physician as a detailed knowledge of the so-called fundamental sciences of medicine, yet I am inclined to rate their importance high in view of the fact that something like half of the problems which the physician must face are as yet un-

labeled by science and have their roots in economic, social, moral,—even historic—conditions.

THE PRESENT CURRICULUM

For the purpose of this discussion, no misunderstanding is likely to occur if we divide the present curriculum into three parts: the premedical, the so-called “preclinical,” and the clinical.

In the requirements as laid down by this Association, these have about an equal share as far as time is concerned though by no means equal in other respects. The theory, though as I think not the practice, of the premedical requirement was that it should supply some of the requirements of a broader education and some of the necessities of a scientific background. But in our eagerness to be sure that science was not too far in the background, we have set down so many requirements in this period as to occupy at least a half of the total. If to this we add anything more than a very superficial knowledge of foreign language and anything more than the barest requirement in the use of the English language, we shall have consumed a considerable share of the remainder. We thus in effect deny any substantial belief in the importance of the fields of economics, philosophy and history above referred to. Certainly the smattering of these subjects which could be obtained in the time at the disposal of the student in the two years premedical course would give him somewhat less than a bowing acquaintance with them. In these fields he will have little or no further opportunity for supervised study while in the fields of science his opportunities are enormously greater. It would appear to be a fair assumption from the results of our present policy that we do not in fact believe that broad educational requirements are important in the training of a physician. Even if we left wholly out of account the importance of the above mentioned group, we might still properly doubt whether the equipment of the modern medical student in his own language was sufficient to stamp him as an educated man. Ability to use English is perhaps more important to the physician than to any other professional group unless it be the lawyer and though it is undeniable that the medical student is untrained, not rarely illiterate, yet our tendency is to increase the load in science to the exclusion of this among other subjects.

I do not at all wish to be understood from the above assuming that the premedical training in science is at the present time wholly satisfactory. It is true that the subjects covered are those which are of basic importance in his further study but it is not true that these subjects are taught at all times in such a way as to be most useful in his further development. The content of the courses is, as a rule, sufficient but the atmosphere which surrounds their giving and their taking is very different from that which the same student will have to face in his medical course. The atmosphere of the college of arts is less conducive to concentration and achievement than will later be required. Furthermore, if these fundamentals of science are given him for the purpose of assisting him in the practice of medicine, they appear to me to lack something of the evidence that they have in fact any relation, however remote. They are likely to resolve themselves into exercises of prodigious memory and it will require an abiding faith in the embryonic physician to believe that they are in fact stepping stones towards his goal. Too often they are in no way related to the further studies in science with which he will later be faced. There appears here at the beginning a lack of appreciation of the laws of learning which is a crying fault of our present plan. A rough evaluation of this two year period would seem to require us to conclude that it is to say the least indifferent as part of a broad education and somewhat ineffective as part of a scientific one.

Coming now to the so-called preclinical division, we see what appears to me to be the most crying fault of our present plan. By definition it is assumed to be a necessary precursor of the clinical division and, by inference at least, to be intended to lead the way toward that goal, but in our desire to improve our teaching in these fundamental branches and by virtue of the so-called concentration, we have erected barriers which are vertical and to an extent at least obstruct progress rather than facilitate it. The sciences tend to become segregated into compartments by these vertical barriers and by their very arrangement to defy sound laws of learning. There can be no doubt of the value of the so-called concentration as an element in our progress to the present time. It unquestionably brought to the faculties of medicine more profound thinkers in these fields and has clearly developed a body of

teachers probably not to have been had by any other method. It has served a most valuable purpose, but I am by no means sure that the arrangement has not to an extent outlived its usefulness. In many of the courses of the preclinical years an immense amount of sheer memory is required and these facts of memory are unintentionally rendered more difficult by the unnecessary isolation of these facts from their application. I think it could be readily shown that the lost motion during these years is greater than can be accepted as necessary. No one would assert or defend the proposition that the student must remember all or the major portion of the facts clearly placed before him but the proposition might, I think, be defended that the amount of actual loss which must be made up by a practical relearning of the subject is out of proportion to the amount of time spent. Now it may properly be argued that one of the purposes of these years is to develop in the student a scientific attitude of mind. This may readily be admitted without carrying with it, as a corollary, the proposition that the acquisition of unrelated facts is an important element in developing the desired scientific attitude. I am by no means sure that it may not have precisely the opposite result. Feats of memory do not, as I think, tend to develop judgment and may even tend to stifle the not overdeveloped desire on the part of the student to use some part of his mind other than his memory.

I believe that at least an interesting argument might be made upon the proposition that the present arrangement of the preclinical years tends to stifle independent judgment and kill initiative. If such an argument could be made even plausible it would go a long way to prove that the present method is undesirable for if one thing be more certain than another, it is that the physician, to fill his place in the community, must be accustomed to weigh evidence and to come to his conclusions if necessary in the face of accepted opinion. Intellectual independence is quite as important as intellectual integrity. Moreover, the plan of the concentration has made easier the very natural tendency of these courses to develop not as prerequisites for an appreciation of clinical medicine but as separate and isolated fields of their own. That this may profitably be the ideal of the teacher in these departments will be readily admitted but that it should be passed on to the student is somewhat debatable. We might, perhaps,

properly assume that these subjects to be of their greatest value must be accurately correlated with the known facts of disease and that their relation should as far as possible at all times be evident. Applying feats of memory is probably essential in the acquisition of knowledge of these fields but under our present arrangement of vertical barriers, these feats become staggering in their isolation from their application. It cannot, I think, be successfully denied that the plaint of the clinician, that the students who come to him have forgotten most of their preclinical subjects, is valid but no more so than the plaint of the teacher of science that the clinician is too rarely able successfully to correlate scientific fact with clinical phenomena.

Coming now to the so-called clinical years, we are confronted with the fact that something approaching two-thirds of the required time has been utilized without any important contact between student and human being. We may be hopeful that we have laid in his mind the foundations necessary to an appreciation of the behavior of the human animal in health and disease but surely we have allowed him a relatively brief period in which to apply the knowledge which we hope he has obtained to the people whom we hope may in the future profit by his ministrations. No doubt a large element in the satisfactory relation between physician and patient belongs in that shadowy realm of personality where teaching has little effect but the prerequisite of personality is given to relatively few and for most of us, long contact with people abnormal, in one respect or another, is essential to satisfactory appreciation of their peculiarities. I do not, of course, assume that at the end of his specified course the student should be a finished practitioner but I do assume that a large amount of time will be necessary to make him even reasonably acceptable to his patients. That this time should be limited to not much more than a third of the required course seems to me to show evidence of lack of proportion. I am inclined to think that far longer contact with patients would be desirable and should be obtained if in no other way, by the abandonment of the vertical barrier. The least time which would seem to me likely to develop his technic of dealing with human beings would be three years and I suspect that this may prove too short for many students who come to their clinical years deeply imbued with the abstractions of science and not well

prepared to view with complete understanding the peculiarities of patients, no two of whom are importantly alike. I am not sure that the present arrangement of the curriculum does not tend to atrophy students on the human side and though I do not assert this as a fact, it will bear study and should it prove true, even to a moderate degree, would be a serious criticism of present arrangements.

If the student at the end of his preclinical years did in fact bring with him a mind trained in science, I should be still more afraid that this would unfavorably affect his approach to patients. It is precisely because I doubt that our present plan does train him in science that I am inclined to regard it as tolerable. However, I suspect that it could be successfully maintained that the student at the end of his preclinical years, which corresponds with many of our students to the period at which a bachelor's degree is being obtained by his brothers, is a less human person than the average. It is here, I think, that the German method of approach has done most harm. From them we have learned much of the use of the animal in the demonstration and investigation of scientific fact but with it has come a distinct tendency to translate the laboratory animal into the field of clinical medicine and confuse him with the hospital patient. It is at least worthy of consideration whether as at present arranged we do not with some success, dehumanize our students and bring them to their clinical studies ill trained as scientists and ill equipped in the humanities. At a period when they should have the broadest understandings and sympathies they, in some cases at least, tend to deal in abstractions and look upon their patients with intellectual curiosity rather than with appreciative interest. If the present arrangement is to be justified, a better case will, I think, have to be made for the present product.

Leaving aside for the moment the possibility that the period of clinical study is far too short, there are certain other suggestions which the critical might make in regard to these years. As already pointed out, a large number and a considerable proportion of the people whom he will have to deal with as patients will have no disease upon which he can put a label and yet something nearly approaching the whole of his time is spent in studying evidences of disease. We hear much at the present time of

the great desirability of periodic health examinations which will enable the man struggling in a complicated environment to have an inventory taken at regular intervals but there is little in the present training of the medical student which would justify the belief that he would be capable of making such a study. He sees far less of the normal than of the abnormal and is likely to be a poor judge of the point always difficult to establish which marks the boundary of normal variation. A considerable proportion of the worst errors now made in surgical, if not in medical, diagnosis is due to the failure to recognize the wide variations within which the human machine can continue to operate. In theory, at least, the student should, during his last years in the school, be concerned with the business of correlating facts and making judgments, but there is little in his previous training which equips him to do either and he is far more willing to accept facts and attempt to arrive at an opinion by a simple method of addition rather than weigh these facts with anything approaching balanced judgment.

Now, in the past, this method of approach was largely taught by the apprentice system and there can be no doubt that it was a most effective method though perhaps time consuming. Our recent tendencies, with a crowded curriculum, by no means too great clinical facilities and often busy teachers, has been to carry over into the clinical years the ex cathedra methods of earlier years of the course. We are far too apt to continue a didactic approach into which the student falls with an enthusiasm born of atrophied mental processes. Many of us would accept as the ideal of clinical teaching the placing before the student of the opportunities to obtain the evidence and the encouragement to draw his own conclusions. The student is little prepared at the present time to profit by this method of approach and it is far too easy for the clinical teacher to accept his receptive attitude of mind and hand down the facts on a platter with the tacit suggestion that they be accepted. It takes a high grade of enthusiasm in the teacher to stem the tide of receptivity which is becoming a curse of medical education. But we cannot on the whole be too critical of the student should he prove to have this attitude of mind, since for some four years we have done our best to encourage it. If a critical attitude, a desire to search out the facts and balance judgments is to be obtained in our medical students, the foundations

of this attitude must be laid at a far earlier period. It is not the natural attitude of the American student, whatever may be the case elsewhere, and it must be developed painstakingly and if necessary, over a few dead bodies. At the present time our attempts to give the student freedom in his later years is likely to be balked by his inability to use it. Freedom, whether in the field of the mind or in the field of government, is a dangerous experiment for those unprepared to accept it. That free thinking is desirable in the older student need not be argued but cannot be expected at the present time as a probable result of his previous training. If we attempt to place the food before him and allow him to eat or not as he sees fit, he is likely to choose very unwisely with resulting intellectual nausea which will not be conducive to further progress.

It thus results that the clinical teacher is seriously handicapped in his methods of approach by the intellectual limitations resulting from the course in the prescription of which he has concurred. He has not, as I think, a very good case for complaint since he has failed successfully to correlate his work with that of his colleagues in science and to work out with them a plan which will bring to him the students in the state of mind he desires.

If we are inclined to be critical of the balance in the pre-clinical years, we must be equally willing to be critical of the balance in the clinical years. Our students certainly get too little of the normal, too little intimate contact with their patients and too little training or opportunity for study in the field of mental disorders. Equally certainly they get too little practical experience in the field of public health and preventive medicine. If we are in fact concerned to turn out those who will develop into satisfactory and successful general practitioners, something like one-third their time must be spent in study of normal people, in judging peculiarities of personality and advising in the prevention of disease and the control of infection.

As a result of this brief, too dogmatic and perhaps iconoclastic survey, I am inclined to believe that important recasting of the curriculum should be undertaken. The premedical years are not well calculated to produce the result which all of us desire. They lack in broad educational training. Their scientific content is too little related to the field of medicine and the pressure

under which the student lives is too low. As the result, he finds the plunge from the arts college into the medical school a difficult one and too often chilled by the temperature, falls by the wayside. The faculty of arts is very properly not concerned to alter its presentation for some doubtful future purpose. The faculty of medicine is without authority and the student suffers. If, as is practically always the case, the student knows at the time he begins his premedical course that it is his intention to go from there to the medical school, such intention should be declared and provided for. He has committed himself to a laborious task and might begin those labors sooner rather than later. The pressure should be equal or approximately equal to that which he will later have to endure. The long summer vacation is an educational anomaly not easily justified when the long road is taken into consideration and due consideration given to the product for which the medical school will later be responsible.

In the preclinical years, the partitions might perhaps be canted so that they run diagonally across the field rather than vertically. A large body of fact must be acquired. It could, I think, be acquired more rapidly and more certainly by an observance of the known laws of learning. Evidence of the goal, even though remote, should be kept visible. Relation between fact and its application will nail it with greater certainty and a longer contact with patients will develop clinical aptitudes in a larger proportion. As a preparation for his approach to his clinical years, a different mental attitude is desirable and could perhaps be obtained in a fair proportion if diligently sought for. In his clinical years, the largely abandoned but none the less valuable apprentice system could be more widely employed. More independent judgment should be insisted upon and its lack might, I think, be made grounds for requiring further study if stubbornly resisted by the student.

Finally, but perhaps most important, throughout the whole period of his education the goal must be kept in sight, that goal being not the successful practice of medicine but the successful service to the community. If at any point either teacher or student loses sight of service as the paramount object of the practice of medicine will fall from its high estate and be classified, and deserve to be classified, as a trade rather than as a profession.

THE CLAIMS OF THE FUNDAMENTAL SUBJECTS

WM. KEILLER

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Since I commenced attending the meetings of the Association of American Medical Colleges, I have noticed two tendencies which have given me much concern, namely a disposition to lessen the teaching responsibilities of the heads of departments and secondly, a desire to introduce clinical teaching into the pre-clinical years. I think both tendencies are dangerous and the design of my paper is to present the other side of both questions.

The tendency to minimize the importance of personal teaching on the part of the senior staff: The general feeling seems to be that teaching is beneath the dignity of heads of departments; that as soon as a man becomes a full professor, research and research only is worthy of his attention. And to this are appended as corollaries two minor propositions, viz., (*a*) that the chief end of the subordinate staff is research, teaching being an incidental, laborious, uninteresting duty, to be got rid of as easily as possible; and (*b*) that any student with a suitable premedical training should be able to get his medical training by himself, given books and laboratory facilities with only occasional aid as he may ask for it, and still further (*c*) that if any man show traces of an original enquiring mind, he should be directed into research channels at the expense of the time necessary to master the enormous amount of accurate knowledge amassed by previous workers and made conveniently available in textbooks and laboratory guides.

Now these may be more or less proper principles for the guidance of graduate schools, especially where the purpose of the school is to make research scholars but not for all graduate schools; but this Association represents undergraduate medical schools and I take it the chief business of undergraduate medical schools is to turn out the largest possible number of well-informed, well-trained general practitioners of medicine for the service of the people. I am quite sure that this is the chief end of most state schools of medicine.

The endowed institution may set its own ideals, but the average undergraduate should not sacrifice teaching to research, nor should the time of the undergraduate be wasted in premature research, to the sacrifice of the laborious acquisition of the enormous amount of information already available, and absolutely necessary that he may approach a patient intelligently and with power to diagnose and heal where possible.

May I ask you to think for a little of the large amount of simple information of which the junior student should have at least a general grasp before he is fitted to approach a patient intelligently. I think I am right in saying that any case, no matter how apparently simple or trivial, may call for a good general grasp of anatomy, biochemistry, physiology, bacteriology and pathology for purposes of diagnosis and pharmacology, and shall I say physiotherapy, and the principles of surgery for treatment.

Let us grant that medical therapeutic measures and surgery belong to the clinical years; they still need a scientific basis in anatomy, biochemistry, bacteriology, pathology and pharmacology, or else clinical teaching becomes empiricism and without scientific background.

Thirty years ago after vast experience in the indiscriminate mixing of clinical and fundamental teaching, and in the fullness of bitter experience, we worked out a strictly graded curriculum according to the practice of British schools, and we went a step further by excluding men from the wards till they had acquired the fundamental background of the freshman-sophomore years. Now it is suggested we should teach them anatomy by showing them a case of carcinomatous axillary lymph nodes, or oculomotor palsy or cardiovalvular insufficiency; biochemistry, by showing them a case of diabetes. This would be all very well if it did not take time from the precious moments necessary to acquire a general grasp of these all important underlying facts.

In Edinburgh Infirmary, when I was a student (and I think the practice still prevails) every clinician had to serve for years as hospital pathologist before he could become eligible on the medical clinical staff, and thus he could approach a patient with a vivid mental picture of the underlying pathology of his ailment, and the only approach to a surgeony was through the laboratory of anatomy.

But what I want especially to get at is that time and undivided attention are necessary if the student is to get a reasonably good general grasp of these all important fundamental subjects.

Two things we should be able to teach in our laboratories, viz., a reasonable amount of carefully selected scientific knowledge, together with some comprehension of the methods by which these facts have been acquired, verified, sifted out; and a sincere love of truth for its own sake. Of course, this presupposes the right kind of student material. No man can plant reverence for truth in the soul of the man who constitutionally loves a lie, or fears the truth; and unfortunately judgment and discrimination come late, and to many men never in any appreciable amount. Knowledge comes early; wisdom, late; but wisdom presupposes much knowledge as one of the constituents of the ground from which it springs.

And let us not forget that if he be the right stuff, with the right fundamental training, all the rest of the doctor's life furnishes a research in clinical work; every case, a research problem; while the freshman-sophomore years are the only chance in all the life of the average doctor when he may get a systematic broad grasp of the fundamental subjects by actual laboratory study. Seldom does a man come to my laboratory of anatomy without having impressed on him by a doctor friend the importance of getting to know his anatomy. Why? Because every day's experience begets again in the physician's or surgeon's mind, the wish that he knew more anatomy. And I suppose most earnest young doctors resolve to come back to college and review anatomy. My laboratories are open to every doctor in the City and State, but I could count on the fingers of one hand the men in the City who in the past thirty years have reviewed their anatomy in my dissecting room, or combined a month's daily laboratory work in the mornings of a summer holiday with the evening's attraction of surf bathing. Still more is this true of the other fundamental laboratories.

How many necropsies does the average practitioner perform in his private practice? How often does he attend a necropsy at the local charity hospital? I believe I am right in saying that the amount of postgraduate laboratory study of general pathology by the average doctor is negligible. Still more is this true with

biochemistry and physiology. How much the more necessary, then, that undergraduate training should be thorough and painstaking!

And here comes in the question of teaching responsibility on the part of the senior teaching staff. Teaching, forsooth, is beneath the dignity of the professor, and the young instructor, who shows teaching enthusiasm, is declassed as a mere pedagogue. We are told that given a cadaver, a good guide, an atlas and a box of instruments, a well-trained mind can acquire anatomical facts by himself and much in the way of help is spoon feeding. Given a museum, a box of slides and a microscope and book, the medical student should be able to acquire the great established facts of pathology by himself. Perhaps this is true for the exceptional man with unlimited time if we do not embarrass him by giving him a research problem to stimulate his research enthusiasm and encourage initiative. But we are concerned with the training of average, not exceptional, minds while time is painfully limited and valuable knowledge accumulating rapidly. Surely the undergraduate years with their wonderful wealth of trained memory's capacity are the years for the acquisition of the legacy of the ages in proved knowledge.

The business of the trained teacher is to guide the student, to save him futile effort, to shorten the time-consuming process of "trial and error" as the price of knowledge, to concentrate his attention on big leading facts and save him from frittering away his time on less important details.

And the first principle of all research must be careful mastery of as much as possible of what has been previously accomplished in underlying allied general fields and the special subject in hand.

And then we must teach our men to do things right, to observe intelligently.

You may let a man dissect all wrong and acquire bad technical habits which will stick to him all through his career as a surgeon, or you may by supervision teach him to handle knife and forceps more or less expertly, and observe with some accuracy, and thus prepare him for the clinical teacher and his future life.

And what shall we say about examinations, those necessary evils, those bugbears of teacher and student alike, those troublesome ledgers that record profit and loss, those time clocks that

record work done or neglected. Are they unnecessary, and insulting to intelligent men of earnest purpose and persevering effort?

Surely they would be so if man were perfect and review unnecessary.

No man loathes examinations more than I do, though as a student I think I rather liked them. As a teacher, nothing bothers me more than a bundle of examination papers, but I have even grown to think State and National Board Examinations may have great teaching value.

First, nothing so trains the student to read that he may understand and remember; nothing so trains him to have his knowledge readily available. Do not let us forget that every case he goes to in after life is a laboratory examination.

In college he pays for ignorance by low grades, or failure; in after life the patient pays by unnecessary suffering and expense; by death.

Then, except in our enthusiasms, the best of us need an occasional whip and the best whip I know is the frequently recurring graded quiz or periodical examination. And if patient work is the means of acquiring knowledge, systematic review is the means by which acquired knowledge is fixed in the memory; and the State or National Board examination is an excellent stimulus to very necessary general review with fixation and coordination of all one's acquired knowledge.

It is an amusing and popular pastime for those who know nothing about teaching to write destructive criticism of school and pedagogical methods. Even Mr. H. G. Wells, with his wonderful general grasp of world history, has his fling at public school methods. But I do not find anything in the way of constructive suggestions.

By present day methods we do not educate in school or college, I grant you. All life well used is education. In some it begets learning and in a few, wisdom; but the school and college years afford invaluable opportunity for acquiring the legacy of the ages in ascertained facts. Let us help our students all we can to make the best possible use of their all too-limited time in acquiring the information on which they may build safely lives of intelligent and skilled service to suffering humanity.

THE RELATIVE VALUE OF SUBJECTS IN THE MEDICAL CURRICULUM

CHARLES F. MARTIN

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It must be obvious to even the most casual reader of the literature on medical education published during the past decade that the scheme is inadequate. The evolution of systems of education is always slow, the problems change with increasing knowledge, and today we are faced with a most elaborate scheme of teaching, one far less satisfying perhaps than that put forth a generation ago. The previously overcrowded curriculum has been still more amplified, for new knowledge has brought new needs; it is well, however, that the *aims* and *ideals* seem to be fundamentally unchanged.

Matriculation. We are, I believe, universally agreed that a standard of matriculation must include a knowledge of the fundamental sciences, but just how many or to what extent is not quite clear—nor is the arrangement altogether rational. For example, a candidate who has had exceptional training say in chemistry and biology and who is possessed of the keen scientific spirit, might reasonably and without prejudice to his future license be admitted to the study of medicine even if he had not mastered all the requirements of physics.

It is impossible, as Wilson suggests, to teach so many complete sciences in the preliminary years of our medical course, and it is a rare student indeed who can attempt to master them, and learn, at the same time, to apply them in later years. And what is more, it is difficult to find physicists, chemists and biologists who will recognize the need of giving merely a sound *elementary* knowledge of the principles instead of trying to cram the brains of students with all manner of technical details, which are neither retained, nor do they generate the inspiration which these subjects are supposed to create. On the contrary, a too elaborate course has confused their brains and left little time for a consideration of simple application to future work. Surely these teachers should cease

trying to include the whole gamut of their subject and deal only with elementary principles, enabling the average student to benefit by this course when he comes to medical studies.

We must deplore also the tendency in these preliminary years to encourage the students to specialize in scientific subjects to the exclusion or diminution of those having broad cultural value.

Medical Curriculum.—With reference to the medical curriculum, Dr. Zapffe's tables of last year compel attention because of their lucid exposé of the differing view point that obtain among representatives of various schools on the evaluation of subjects in the curriculum. While it is undeniable that certain strict standards were necessary prior to the Carnegie investigation, the improvement throughout the continent has been such that the general standard now appears normal.

There is, I believe, a general impression that the criterion of evolution based on hours should be modified, or partially abandoned. "Time spent" is but an indication on paper of a certain idea, but conveys no index of the value of such education.

There is still much to be said in favor of the English system, which demands (*a*) a general attendance at lectures and clinics, not too strictly censored, and (*b*) a minimum time limit between the preliminary and final subjects, expressed in months and years not hours, leaving the ultimate test to an impartial, impersonal examination of a searching character as to how those hours and days have been spent.

The adoption of the distinctive type of examination proposed by Dr. Edsall would mark a great advance, and if feasible, would do much to create a higher type of medical education. I fear, however, that it would necessitate teachers of exceptional calibre and students with unusual training. In some respects it matters little how or where or when the student receives his information, so long as it is of the right kind and that he can prove this to his arbitrators.

What an anomaly it is that in certain states a candidate who has received excellent private tutorial training in some of the pre-clinical subjects is ineligible for future license to practice medicine because this training, forsooth, has not been under the auspices of a university.

What a happy prospect it would be were the German system

adopted, whereby a student was encouraged to visit different schools in different semesters according to his appreciation of the courses given, and the inspiration to be derived from the teacher.

I am more and more convinced that our medical schools suffer in a large measure for want of more highly trained experienced teachers, men gifted to instruct with simplicity, to discern the student's needs and his capacity intellectually to digest what he has been taught. It is the confusing introduction of non-essential details that so often render the students unable to appreciate and retain what is of primary importance. The rule, I believe, holds much more frequently in Europe than in America that the fame of individual teachers attracts students. Competitive teaching is always a salutary stimulus.

The majority of students are, after all, destined for the practice of their profession, therefore, while they are being taught in simple fashion, their imagination should be stimulated—to make them thinking creatures fit to approach their daily problems with an investigative spirit. No teaching is so easy as that which merely imparts information, and the unresourceful student likes to be spared intellectual effort.

To revert to Dr. Zapffe's tables and to the scheme laid down by the committee, one notes with interest that to anatomy is granted three or fourfold the time allowed to physiology, and twice as much as is devoted to physiology and biochemistry combined. In the older schools, anatomy took precedence over all other chairs, and anatomy it was which, during the Renaissance, "brought life and liberty to the healing art." With few exceptions, the great men in medicine, prior to the eighteenth century, were anatomists. Small wonder, then, that with such a tradition, anatomy today occupies such an important rôle in the medical schools. The influence of John Hunter lives today, and through the centuries since anatomy has held the foremost place in the early years of medical education.

While formerly anatomy dealt with the knowledge of the human frame alone, and thus was considered a proper introduction to the study of function, latterly its association with biology and physiology has added much to our understanding of the subject. While I yield to no one in my appreciation of the importance of anatomy, I would beg leave to remark that the early traditions sur-

rounding this subject are dying hard. In the middle ages only anatomical laboratories existed, but with the rise of physiology and pathological sciences, the importance of anatomy has relatively diminished.

It is, of course, well recognized that for the most part anatomy must be taught in the dissecting-room, while physiology entails, perhaps, more study at home, and, to some extent, this may account for the time arrangement. But I take it that the present method of teaching affords benefit mainly because of the information it gives as to morphology and structure, *i. e.*, the training of the eye to observe and the hand to become dexterous. To some extent, too, the student may be taught in better schools to seek and to deduce the cause of anatomic relations—why this and that structure is so placed and so formed, and what its living function is; but surely the study of physiology, general and experimental, stimulates the imagination still more and exerts a relatively greater influence in the development of the thinking powers.

Were the teaching of anatomy today universally recognized in its broader biologic aspects and were the study of anatomic function more stressed than it is, the reason for this disparity of time might be justified. It would seem, however, that the long hours repeatedly devoted to minute dissection of the extremities, of the nervous system, of the fascia, might be curtailed with some advantage, and more interest concentrated on the study of the functional anatomy of the viscera.

I would like to suggest less of formal anatomy in the dissecting room and a great deal more of applied anatomy in the medical and surgical clinics as each occasion arises.

Efforts have been made with us to render the study of anatomy less dead; the living subjects are brought to the lecture room and to demonstrations: surface markings are painted on the skin to illustrate the underlying vessels, lymphatics, glands and other structures. Groups of students observe about the living subject those structures which, immediately before, they have dissected on the cadaver.

The term "applied anatomy," as used for special courses, seems to some extent a superfluous one. Were the anatomic instruction rendered more living, not only in the anatomy rooms, but in the major clinics the advantage would be incalculably great. I do

not wish to be misunderstood as believing for a moment that the study of anatomy does not afford one of the best means of training that a student can have. Observation in its broadest sense implies thinking, but in its more restricted sense in the case of so many minute dissections, I doubt if the imagination is sufficiently stimulated.

What holds for gross anatomy is equally true of the microscopic. Histology, when taught with dead tissues does not afford the student an adequate conception of the living cell. For this reason, and as a handmaid to histology and physiology, we have introduced into our first year, a laboratory course under the name of "general physiology," which deals with the function of the living cell, where, to a certain extent, the student teaches himself by observation as to the properties and functions of the living protoplasm.

Biochemistry and biophysics which have in recent years attained a high degree of specialization, should, I believe, be much more closely linked up with physiology. Modern physiology must, after all, embrace much of biochemistry, for normal biochemical function is physiological function. The divorcement has already proceeded so far as to be in many schools a complete separation; nay more some have made bold to suggest that the biochemist should monopolize the physiology of certain functions; *e. g.*, the excretions. Biochemistry must, I believe, always have its independent place in the medical curriculum, but it would seem to be the duty of the physiologist to review systematically the chemical features of his course if a rational sequence is to be established.

The Specialties.—Two agencies have created an abnormal condition which in no small way has embarrassed medical education for the undergraduate, *viz*: The growth and development of our hospital clinics, and the closer association of the universities and hospitals.

The ever-increasing discovery of new methods and new appliances, in the diagnosis and treatment of disease has created specialism, has so decentralized our hospital work that its effect has been simultaneously felt on our studies. Large special clinics have been created, and from this, there has evolved the idea of teaching undergraduates in so elaborate a way as to interfere with the simpler teaching of major subjects. Thus there has slipped

into the curriculum the long list of specialties for the undergraduate student. The student is already staggering under the load, and he should not be expected to acquire more than the merest introduction to any of those subjects included in the specialties. He should acquaint himself with the general principles and their application to general medicine and surgery. Time and space for details of this kind should be offered in the hospital year as an option, or in a post-graduate school. The pendulum has swung already too far, and we should return to a reasonable *status quo nate*. And remember that paramount importance attaches to medicine, surgery and obstetrics.

Now, while the specialists admit the inadequacy of time, there seems no abatement in the desire to cover a course of instruction far in excess of the actual needs. The ophthalmologists, for example, demand 60 hours in which to teach the undergraduate the principles of how to save the sight, to prevent unnecessary loss of sight and to learn the simpler diseases of the eye. Doubting the wisdom of so much effort, I would delete most of such instruction and cut the time by half in undergraduate teaching, leaving the rest to optional courses in the hospital year or to post-graduate study. It is to be regretted that in general medicine and surgical clinics so little is done to stress the application of such principles to general medicine and surgery.

What applies to ophthalmology holds equally good for orthopedics, genito-urinary diseases, neurology, psychiatry and advanced pediatrics. It would seem far more important for the intelligent general practitioner to realize his limitations and leave to more experienced men the care of conditions to which experience alone can bring satisfactory results.

The undergraduate course is not a finishing school, rather is it an introduction to the technic of practice, and a medium for developing in the practitioner an inquiring mind which enables him to approach the problems of disease in an intelligent manner.

"Only as a physician does one become a physician," was said with very real significance as applying to the needs of modern medical education.

In our clinical years, then, let there be broader outlines of study—much more of general medicine, general surgery and obstetrics. More of principles and less of detail. More of social

science and environmental medicine, less of specialties. It is not necessary to see every disease to understand the practice of medicine. In the complete study of one disease over a period of weeks, one teaches more than in twenty clinics on different maladies. Such was the practice adopted by Sir William Osler, who, during one term, confined his clinics to the various phases of pneumonia; and what a fund of general information they afforded!

Environmental medicine, so picturesquely described by Dr. Emerson, might easily be emphasized with advantage in the general major clinics: the social service feature should be a part of every medical record, just as should be the principles of preventive medicine. Judging by the defections of patients from the regular to the irregular practitioner, physiotherapy needs more attention in a general course. From what has been said it follows that a triple ideal awaits realization: First, a more flexible curriculum—one that will not excessively tie the hands of students or teacher. Second, a change of attitude toward the student, treating him no longer as a schoolboy but as a self-dependent member of a university corps; and, lastly, the acquisition of that highest type of teacher gifted with power to develop in his students a genius for creative thought and for contributing to the advancement of his profession.

DISCUSSION

ON PAPERS OF DRS. KEILLER AND MARTIN

DR. W. F. R. PHILLIPS, Charleston, S. C.: I didn't hear Dr. Keiller's paper, but I think I know what it was because I think we are in agreement about certain things, at least.

I think what Dr. Martin said is eminently true. We have been saying it for years but we are no further than saying it. We get too much detail, but no one has told us how to get out of the detail.

Not long ago the question came up in our faculty about the inefficiencies in anatomic teaching. The question was raised: What should be taught anatomically? A number of teachers were asked to tell the anatomical department what it should teach. They met together, ophthalmologists, internists and surgeons, and so on, and they came to the conclusion that they could not omit anything. The anatomist was left to do just as he had been doing, trying to cover everything in the human body because every one seemed to want it, but in a time totally inadequate to cover it. A man cannot learn anatomy as apparently it is wanted in the time allotted to him.

Of course, I think there is a good deal of criticism of anatomic

teaching and I think that criticism can find some justification in the fact that of recent years we have insisted that an anatomist give all his time to anatomy, and the other fundamental teachers all their time to their subjects. We are not asked or brought in consultation with the clinical side; therefore, we have to go along and blunder away as best we can without knowing what the clinician wants, and the clinician in his turn not knowing what we know about the subject that might be helpful to him.

I think the whole thing results in that we do not get together and give thought to what we want. We come together and pow-wow over it and say the whole thing is going to the "demnition bow-wows," but none of us take any hand in straightening the matter out.

DR. RAY LYMAN WILBUR, Stanford University, Calif.: The greatest obstacle to a procedure of this kind is an inherent quality of the professor. I call it that because they all seem to possess it. They never willingly let go of a curriculum hour once allotted. There is a tenacity in the professor for what he has had in the way of time that is as gratifying as it is perfectly astonishing. It is true that they pass this responsibility to younger members of the staff. They are much in the mood of one of the professors in the institution which I represent who came to me and said something like this:

"I am going away on leave. I have turned over to my associate (naming him) most of my affairs. He is going to take care of my wife who is going to stay here. He is going to run my bank account and take care of anything else of a financial nature which may come up. He is going to look out for a paper I have written for a certain meeting, but you keep an eye on him and see that he makes no changes in the courses while I am gone. I trust him with my wife and my money, but not with those courses." (Laughter).

That is a quality which seems to be universal and it is one of the obstacles that we must take care of in trying to bring about these changes. Somebody has to either do a little blanketing of unnecessary courses, or a little dynamiting, or what they did to the candle when it was too bright. That means that bodies like this, supposed to be impartial, must do what they can to do what is right and help the administrative officers to do what is right. We must get the specialties out of the undergraduate curriculum.

We have to keep the fundamental sciences up to date in relationship to the work required. We must hope that groups like this, working along these lines, can eventually do that, but they cannot do it unless they are willing to fight to the point where they overcome the individual who feels his priority rights in a subject are such that he must maintain them regardless of the benefit to the student or anybody else.

It must be done by pointing at that quality of the professor which we most admire but which we must not let go on unhampered.

DR. STEPHEN RUSHMORE, Boston: I am not prepared to accept the implications in regard to what are the fundamental sciences. For example, we say that structure and function are the two things we want to study in the fundamental sciences, and we have a conception that structure is more or less mechanical, and function is covered by physiology, but in medicine we are dealing with something more than that, with the factor not comprehended under physiology. We are dealing with persons.

I am not prepared to formulate a curriculum which includes this, but we have been considering it for some time, and it is perhaps well represented by the dictum of James Harvey Robinson, when he said, "We must humanize knowledge." I think it is necessary to humanize the earlier portion of our medical curriculum and introduce at an earlier point than we do now this additional element which comes from the contact of the physician with persons and not from these other factors which we comprehended under the terms of "structure" and "function."

"Function" is an indefinite term. It means more than physiology or biochemistry. It introduces an element above that, an element which is psychologic.

DR. C. A. HAMANN, Cleveland: Every teacher believes that his own subject is the most important one. It has been said that if astronomy were put into the medical curriculum the professor of that branch would say in his introductory lecture that without a knowledge of the positions and motions of the heavenly bodies it would be impossible to become a good doctor. Having taught anatomy for many years I naturally think it is the most essential subject; the teaching of it, however, should early be combined with its practical applications.

DR. SAMUEL A. BROWN, New York: I agree with Dr. Wilbur. We can talk about modification of the curriculum all we please, but the difficulty is we talk mostly. One solution would be not only the selection of the Curriculum Committee, but the giving of power to that committee, so that when their decisions have been reached, they will be indisputable. The committee may make mistakes, but mistakes may be arrested.

We can talk indefinitely about reducing hours, but unless we give some committee power, we will reach no decision and I think the reductions can be made and the executive officers relieved of embarrassment if this is done.

DR. WM. KEILLER, Galveston, Texas: The older I grow, the more terrible has this whole medical curriculum become, and I am beginning to feel that I don't know anything about it.

INCREASING THE USEFULNESS OF EXAMINATIONS

M. R. TRABUE

Bureau of Educational Research, University of North Carolina

In coming before the Association of American Medical Colleges to discuss such a topic as "increasing the usefulness of examinations" it is advisable to state at the very outset that I am not in any sense a medical man, and that I claim little familiarity with the actual techniques and procedures employed in medical colleges. Your secretary wrote several months ago asking that I discuss this topic before you, and I therefore assume that at least some of you are not fully satisfied with the examinations customarily given your students. I assume furthermore that the examinations concerning which your secretary asked me to speak are examinations of the knowledge and information possessed by your students rather than examinations of their health and physical condition. I shall leave the physical examinations entirely out of account except as they may serve as analogies in indicating the characteristic qualities to be sought in satisfactory mental examinations.

I shall assume also that examinations of knowledge and information are intended to serve the same purposes in medical education as in other fields of instruction. It is probable that the criticisms which have been applied to examinations in English, mathematics, education, psychology, and other subjects are very similar if not identical with the criticisms of examinations in the medical curriculum. It will be my purpose, therefore, to tell you something of the efforts we have been making to improve classroom examinations in the public schools and colleges and to suggest that you will no doubt find it worth-while to experiment with the examination techniques which we have been developing in these other fields. I have no assurance whatever that my suggestions will solve your examination problems, but the success which has met our efforts in other fields seems to me to war-

rant the hope that it may be possible to increase the usefulness of examinations in medical schools as well.

I am aware that this is by no means the first discussion of this problem to come before the medical fraternity. Dr. George Blumer presented in 1919 an excellent article in the *Journal of the American Medical Association* (Vol. 72, pp. 1131-1133), entitled, "Desirability of Changing the Type of Written Examinations." The medical school staff in each of several universities has been experimenting with the improvement of subject matter tests for a number of years. In most cases this experimentation has been done in cooperation with a psychological or educational officer of the university. The work at Columbia University, for example, has been guided and stimulated by Dr. Ben Wood, to whom I am indebted for most of my illustrative materials. At the University of Michigan the medical staff has had the advice of Dr. S. A. Courtis, while at the University of Minnesota, I believe, Dr. Donald Paterson has been of considerable assistance in these experiments. I am not certain, but I presume that Dr. C. E. Seashore has been working with the medical instructors at the University of Iowa. In spite of the chance that I may be repeating statements and quoting data that are known to some of you, I shall treat the problem in a fairly elementary fashion in the hope that my discussion may stimulate some who have not yet begun to experiment in this field.

Almost any public school teacher, if asked for a statement of the purposes of examinations, would say that they are intended "to show how much the student knows." I presume that this is a common-sense answer and that, perhaps, we ought not to refine it too greatly, but I wish to indicate three rather distinct and somewhat more specific reasons for the use of written examinations of one sort or another.

First of all, there is a very important instructional purpose in giving examinations. It is easy for a student, especially if he is just beginning a new field, to become lost in a mass of details. So many new words and ideas are crowding in upon his mind that he sometimes loses the significance and the relationships of the various items. The announcement of a written quiz or examination frequently serves to stimulate the pupil's thought and to cause him to reorganize and to relate the multitude of items to

each other in a way that would not otherwise occur to him. In many respects this reconstruction of experience and knowledge is perhaps the most important purpose served by the usual school examination.

In addition to stimulating the pupil to reorganize his thought, examinations frequently reveal to the pupil and to the teacher the weak spots in the pupil's information. Students frequently have the experience of being somewhat at a loss to understand just what an instructor is trying to do to them, or for them, until a test or examination of some sort has been given. Such an examination or test often gives the student his first clear conception of how he should study and where he should place the emphasis in the subject matter under consideration. The teacher, on the other hand, is frequently at just as great a loss in his understanding of the pupil until a test has revealed the characteristic gaps and weaknesses in the pupil's grasp of the subject. If you will pardon me for making use of a term which you would no doubt reserve for your own professional field, the examination of the student's knowledge in a subject may serve as a partial basis for a diagnosis of his mental processes.

The third purpose served by the written examination in many schools relates to the classification of the pupils. It is quite customary to administer a final examination in a course as the basis for an index of the student's readiness to be reclassified or promoted. There is some doubt, one must admit, as to whether any written examination can adequately serve this purpose. Wherever it is necessary for one to master a particular background before advancing to the study of more advanced material, some sort of measurement of that preliminary knowledge should be available. There are many instances, however, where the ability to write or to speak glibly about a subject indicates very little regarding the student's practical knowledge of it. I have no doubt that there are in your classes students who can recite freely the statements of their textbooks regarding the muscles, nerves and other tissues of the human body, who are, nevertheless, quite lacking in recognition when brought face to face with these same tissues concerning which they can speak and write so readily. There may be, on the other hand, students who have difficulty in discussing these tissues in a written test but who can identify

them and interpret their functions quite intelligently when in their real presence. In general, however, it is customary to accept a good written discussion of a subject as fairly reliable evidence of practical knowledge. We should at least be safe in saying that most promotions and reclassifications are based on some sort of final examination or test.

Any attempt to increase the usefulness of written examinations should be checked against the three purposes of examinations just mentioned. Unless the suggestions which I shall make modify your examinations so that they actually cause the students to review more adequately and to organize more intelligently than heretofore the facts which they have mastered, so that the examination results indicate more clearly to the student and to the teacher the weakness in the student's knowledge of the subject, and so that the answers to the questions do tend to supply a more adequate index of the student's preparation for the experiences which are to follow, you may promptly dismiss my suggestions from your mind as being inapplicable to your field. These three purposes of examinations have been served more adequately in other fields of knowledge by what we have come to call the "new-type examinations" than by the traditional type, and it is for that reason that I have accepted the invitation to appear before you and tell of our experience in the hope that it may be suggestive and beneficial to you.

Before describing the "new-type examinations," it may be worth while to fix clearly in our minds the characteristics of the traditional type of examinations. The usual examination in the public schools and colleges consists of five or ten questions calling for explanations, comparisons, and other extensive statements by the student. In an Illinois high school, for example, the final examination in zoology contained ten such questions as the following:

HIGH SCHOOL ZOOLOGY

1. Name at least eight branches of the animal kingdom.
2. Discuss the classification of animals.
3. Explain how the amphibia stand between the fishes and the reptiles.

4. Give four illustrations of insects adapted to their environment.
5. Why are the forifera a step higher than the protozoa?

Such a list of questions can be made up rather quickly by almost any competent teacher. An effort is usually made to distribute the questions among the most important topics that have been covered in class work, with perhaps one or two questions that dip down into minor issues in an attempt to sample the student's mastery of details. When the student has written frantically for an hour or more in an attempt to get all his knowledge recorded in a little examination book, the teacher takes the result and reads the ten essays which have been so hastily written. Some instructors give a grade to each of the essays or answers prepared by the student, while others assign their grades on the basis of the general impression created by the entire lot. In any case, the grading of examination papers of the usual type resolves itself chiefly into a reading and evaluation of compositions or essays. This traditional kind of examination has therefore come to be known in educational circles as the "essay type" of examination, and I shall refer to it by that name in the discussion which follows.

I am told, although my information may be historically incorrect, that medical men before the manufacture of clinical thermometers were accustomed to depending on their own individual judgments as to the amount of a patient's fever. Many of these old-time doctors doubtless developed an unusually sensitive touch and were able in an instant to detect rather small differences in the heat of a patient's brow, but no modern hospital keeps its temperature charts on the basis of such personal judgments. And yet such judgments would be a much more adequate guide for medical treatment than are the judgments made by an instructor in marking the essay-type examination papers of his students. The brows of two patients with the same temperature would present a relatively uniform basis for judgment, but the essays of two students having the same degree of knowledge of the subject are likely to be very different in their language and in their method of teaching the facts.

One of my students two years ago decided to find out how serious the disagreement would be among teachers of certain

subjects in the accredited high schools of North Carolina.* He selected a typical set of examination questions in each of three subjects and then selected from the papers written on each set of questions a representative set of answers written by a first-year high school pupil. These answer papers, which were chosen because they seemed to contain no unusual characteristics that would tend to cause disagreements, were mimeographed with the examination questions to which they supplied answers, and the entire set of materials was sent to the principals of the accredited high schools in North Carolina. Each principal was asked to have his teacher of first-year English read and mark the English paper, to get his teacher of general science to mark the paper in general science, and to instruct his teacher of first-year mathematics to read and to mark the mathematics examination paper.

Sixty-five high schools sent in reports of the marks assigned to these papers. If we assume that 70 per cent is the passing mark (and that is in these high schools the most common point for distinguishing those who pass from those who fail), the girl who wrote the examination paper in English would have failed in ten of the schools, although she would have passed in fifty-five others; the boy who wrote the science examination paper would have failed in sixteen of the schools, but would have passed in forty-nine; and the boy who wrote the mathematics paper would have failed in twenty-seven of the sixty-five high schools, even though thirty-eight of them would have passed him without question. Three English teachers thought the English examination paper was worth a grade of 93 per cent, but one rated it at 54 per cent and three others rated it at 65 per cent. Two teachers of mathematics rated the mathematics examination paper at 94 per cent, but one thought it worth only 42 per cent, one 44 per cent, and another 45 per cent. Five science teachers rated the science paper at 95 per cent or above, but five other equally well-trained science teachers rated exactly the same answers to exactly the same questions as worth less than 50 per cent.

Success or failure in an examination given in an accredited high school in North Carolina seems to depend largely on who

*L. R. Sides, "Scholarship Mark," *The North Carolina Teacher*, Vol. I, No. 7, p. 196.

marks the paper. Similar studies during the past fifteen years have revealed the same kinds of disagreements in the schools and colleges of many different parts of the United States. Whether similar differences in marking standards would be found among the instructors in the medical colleges, I cannot say. I should not be surprised, however, if it were discovered that there are some rather wide differences in standards even among medical instructors.

Perhaps the greatest defect of the essay-type of examination is this subjective character of the grades or marks usually assigned by the instructors. Some interesting experiments have been conducted during recent years in which it was revealed that the same instructor, if asked to rate a paper ten days or two weeks after a previous rating and without knowledge of the rating previously assigned it may radically alter the grade assigned to exactly the same examination paper. It is very much as if a physician were to count a patient's pulse today and report it as 70 per minute and then count it the next day and report it as 80 per minute when as a matter of fact no change in pulse rate had taken place. To be of maximum usefulness a measuring instrument must yield approximately the same record for one observer as for another. A rating obtained by an examination should be so objective—so little dependent on the observer—that any competent person might easily verify it. Essay-type examinations seldom yield anything that even approximates an objective rating. There are other unsatisfactory characteristics of the essay-type of test or examination, but I shall leave them for later discussion.

The “new-type” examinations or “short-answer” tests came into prominence through certain necessities connected with the World War. In attempting to adapt the so-called “intelligence tests” for economical use with large numbers of men the psychologists hit upon the scheme of presenting long lists of plausible statements from which the man being examined was to select those that were correct. The word “True” and the word “False” were printed after each statement and the recruit was asked to underline the one of these two words which best described the character of the statement. I have adapted an illustration

from a recent examination at the College of Physicians and Surgeons of Columbia University.

UNDERLINE "TRUE" OR "FALSE"

- | | | |
|---|------|-------|
| 1. The female mammary gland is situated in the deep fascia..... | TRUE | FALSE |
| 2. The axillary vein lies lateral to the axillary artery | TRUE | FALSE |
| 3. The rhomboid muscles are supplied by the posterior primary division of the fifth cervical nerve..... | TRUE | FALSE |

You will observe that no writing is required in such a test, which is of course an advantage to the student in that there is no danger of his being attacked by "writer's cramps." There are also great advantages to the instructor. One can secure an expression of the student's judgment or memory for a hundred or a hundred and fifty different items in the same time required for obtaining ten or a dozen answers of the essay variety.

No equivocation is allowed by this type of test. The student's reply is either true or false. It is, of course, possible and advisable for him to make no reply if he is not sure of his information, but when a reply has been made it is perfectly clear to the reader without having to stop and ponder on the meaning of the writer's language and handwriting. The student studies the wording of the question where formerly the instructor studied the wording of each student's answer.

The greatest objection to this true-false type of test is that one cannot be absolutely certain of the student's knowledge of any particular item. He may have guessed and guessed correctly with regard to any specific proposition. If the instructor in making up the examination prepared fifty false statements and fifty true statements, the chances are that someone who knew absolutely nothing about the subject would, by marking at random, mark half of the propositions correctly and the other half incorrectly. For this reason it has become customary to obtain a student's score in true-false by subtracting the number of incorrect responses from the number of correct responses. Thus, if a student had checked incorrectly twenty statements out of a list of one hundred, but

had made no response to ten statements and the correct response to seventy propositions, his score would be only fifty points ($70-20=50$). This method of scoring, known as the "Right minus Wrong Method," gives one a fair measure of the student's knowledge of the general field covered by the test, but it leaves the instructor in doubt as to the student's certainty of knowledge on any specific item in the test.

Another modification of the true-false test is known as "the yes-no test." The illustration will show that in all essential details it is similar to the true-false variety. It has the same

UNDERLINE "YES" OR "NO"	
23. Is the radial collateral ligament of the elbow attached to the radius?.....	YES NO
24. Is the head of the radius subcutaneous posteriorly?	YES NO
25. In pronation does the radius lie diagonally across the ulna?.....	YES NO
26. Does the radial styloid process lie at a level distal to that of the ulnar styloid?..	YES NO

defects and advantages, and it employs the same "Right minus Wrong" method of scoring. Some instructors claim for it an advantage over the true-false form in that a question seems to them to provoke more intelligent and critical thought than a straight-forward statement. Perhaps it is better to ask a question than to state an untruth. You may take your choice.

Still another variation of the true-false test has become very popular. Instead of underlining a word the response consists in making a plus sign (+) to indicate that a statement is considered true and a minus sign (—) or a zero (O) to indicate that it is thought to be false.

Put a plus sign (+) before each true statement, and a zero (O) before each false statement.

- 47. The cribriform fascia covers the subcutaneous inguinal ring.
- 48. The lacunar ligament is the medial boundary of the femoral ring.
- 49. The femoral nerve lies in the lateral compartment of the femoral sheath.

It will be observed that in each form of the "true-false" test the student's responses are arranged in a column down one side of the page. This device makes it easy to score the results. A strip of paper or cardboard, having the same length as the column of responses and having recorded on its edge all the correct responses in their correct positions, may be placed along the column of responses in such a manner as to show at a glance whether the responses are correct. Inexpensive clerical labor may

(Printed page of test questions with responses)

KEY		
20	+	...+... 20. The vestibule is the.....
21	O	...O... 21. The trigone of the.....
22	+	...+... 22. Hasselbach's triangle.....
23	+	...+... 23. The superior hemorrh.....
24	O	...O... 24. The obturator extern.....
25	O	...+... 25. The inferior fascia.....
26	+	...+... 26. The pudental nerve.....
27	O	...O... 27. The dorsal vein often.....
28	+	...O... 28. The superior fascia.....

then be employed to mark the papers in accordance with such a "Key" or "Stencil," which can be prepared at the time the questions themselves are prepared. The reader of an examination paper of this type does not actually read anything—he merely compares the student's responses with those that appear on the "key." In the illustration, for example, the student's responses correspond with those on the "key" except at item 25

and at item 28. The clerk who was examining this paper would mark the numeral 25 and the numeral 28 and would later count up all the items marked "incorrect" and subtract their total number from the total number of items that were correct, in order to obtain a fair estimate of the probable extent of the actual knowledge of the student. Having all the student's responses recorded in simple form in one column makes possible the use of a scoring key, which in turn makes it possible for the busy instructor to turn over the marking of the papers to some clerk who may be entirely ignorant of the subject-matter of the test.

Other types of short-answer tests have been widely used, although the true-false test enables an instructor to cover a larger number of items of information in a given period of time than any other test now known. A very useful test form is that which requires the student to choose the best among four or more answers to a question or completions of a statement.

CHECK THE CORRECT ALTERNATIVE	
28. Emulsions are incompatible with	
<input type="checkbox"/> equal parts of spirits.	
<input type="checkbox"/> aromatic waters.	<input type="checkbox"/> elixirs.
	<input type="checkbox"/> syrups.
30. Tinctures of the more important drugs usually have a strength of	
	<input type="checkbox"/> 1% <input type="checkbox"/> 5%
	<input type="checkbox"/> 10% <input type="checkbox"/> 20%
32. Dover's Powder contains approximately the following percentage of powdered opium:	
	<input type="checkbox"/> 0.1% <input type="checkbox"/> 1%
	<input type="checkbox"/> 10% <input type="checkbox"/> 12½%

The particular value in this form of examination is that it offers the student fewer opportunities to guess correctly than he finds in a true-false test. There is still one chance in four, if the problem offers only four alternatives, that a pure guess may be correct, but in general an instructor may be more confident of the student's knowledge when he has selected the correct item out

of four than when he selected the correct response out of a possible two. The larger number of alternatives from which the student is required to choose, the smaller the possibility that any correct response is due to guess-work.

An improved form of this multiple-choice test arranges all the student's responses in a column, in the same manner and for the same purpose as was done in the true-false test. By numbering or lettering each of the alternatives in a given question

SELECT THE CORRECT ALTERNATIVE AND PUT ITS NUMBER
ON THE SHORT LINE

4. In Fowler's Solution arsenic is present as—
 1, arsenic trioxide, 2, arsenious acid,
 3, potassium arsenite, 4, potassium arsenate.
6. Fowler's Solution is incompatible with—
 1, sodium bicarbonate, 2, dilute hydrochloric
 acid, 3, aromatic waters.

and providing a column of spaces for entering the numbers or letters of the correct responses, it becomes possible to employ scoring keys and inexpensive clerical labor in calculating the scores of students. Of course it is not necessary for an instructor to turn over the scoring of these examination papers to a clerk, but such a procedure is possible on account of the objective nature of the tests. A clerk can arrive at the same score the professor would find. just as a nurse can take the temperature of a patient and obtain the same result the most skillful physician would get.

Still other variations of these short-answer tests might be described. The accompanying illustration from a recent test in

If therapeutic doses increase functions activity, use +; if they decrease it, use —; if the drug has no action, write O.

	Atropine	Strophanthin	Nitrites
Bronchioles
Gall bladder
Small intestine
Large intestine
Ureters
Uterus, rabbit

pharmacology at Columbia University is especially suggestive, for it makes possible in a very brief space a tabulation of many specific items of information regarding the action of different drugs on different organs and tissues. Such a test form requires a minimum of writing on the part of the student but supplies a maximum of evidence to the instructor regarding the student's knowledge.

The sentence completion test, with which type of examination form my own name has been closely identified, has certain ad-

COMPLETE THE FOLLOWING CORRECTLY

42. The primary oblique fissure of the lungs usually extends from the.....thoracic vertebra to the costal cartilage.
43. The dome of the diaphragm on the right side reaches as high as the rib.
58. The knee joint is entered by the tendon of the muscle.
62. The middle cuneiform bone articulates with

vantages that are not possessed by the true-false variety or by the multiple-choice type. Perhaps the most significant element in the completion test is that the student must recall the proper word to write on each blank without any direct suggestions from the test blank itself. Instead of choosing the best from a list of suggestions or judging whether a particular suggestion is correct, the completion test form requires the student to make his own suggestions and then to choose from among them. It is unfortunate that this type of test is not more easily scored. It requires much more time and a broader knowledge of subject-matter to score it than the other types require. In spite of the time and skill required in marking completion test sentences, they are being used quite widely and in many different subjects.

With this much explanation and illustration of the newer types of short-answer examinations, we may close with a brief comparison of them with the older essay-type of examination. Little time is required in the preparation of the essay-type of

examination, but much time and careful thought are required in preparing a good test of the newer form. The questions for the older type of examinations could be written on the blackboard or read to the class orally, but the elements of the newer type tests should be carefully mimeographed or printed. The older type covered ten or a dozen selected topics in a general way, while the newer type may be made to cover several scores or hundreds of specific items from all parts of the field studied. The student taking the older type of examination wrote page after page of English composition, frequently finding the time allowed for the test inadequate for the expression of all he wanted to say, while the student taking the newer type of test spends most of his time doing some careful thinking, with a moderate amount of checking, underlining, or writing of individual words and numbers. The instructor spends hours of his time reading poorly constructed essays in the case of the older form of examinations, and frequently the quality of the English in which the ideas are expressed enters largely into the instructor's estimate of the student's knowledge. In the case of the newer forms of examinations the instructor may delegate the reading to some assistant as soon as a key has been prepared, and the assistant will not only mark the papers just as the instructor would but will complete the entire job in a very short time.

Statistical calculations have demonstrated that the newer examination forms agree much better with themselves than the essay-type examination marks given by different instructors or by the same instructor at different times. Not only do the newer forms show higher reliability or self-correlations, but they also show higher validity when correlated with later success in the field being tested. There are several reports in print showing this superiority of the short-answer examinations in the liberal arts colleges, and a few reports on their use in schools of law, education, and the like. I happen to know of one report now in press which shows the same, if not greater superiority for the new-type examinations in a medical school.

Although I should not now advocate the complete abandonment of the older exercises in which the student was asked to "discuss," "explain," "elaborate," "prove," and the like, I do recommend that you experiment freely with the short-answer

examinations. They seem to stimulate reorganization and review, to reveal the student's weaknesses, and to supply a basis for classification or promotion more objectively and effectively than do the older examinations; and since these are in my judgment the chief purposes of examinations I believe the experimentation which I recommend will actually result in increasing the usefulness of your examinations.

DISCUSSION

DR. WILLIAM DARRACH, New York: I want to endorse what has been said in favor of this method of examination. If we stop to think what we obtain in those examinations as compared to the older method, we are startled. If we are trying to estimate the amount of information in a student's mind, as measured by the examiner, and then follow through the various steps, we realize how mediate the process is and how many chances for error there are. We have the information in the student's mind which may or may not be elicited by different questions. For instance, a student often misreads a question either in whole or in part. He doesn't translate the question the way the examiner meant him to. Then he starts to answer it and his English may be at fault; his composition may be poor or his writing illegible. When you come to the receiving end much depends on the state of mind of the examiner at the time he reads this paper, whether it is early or late in a group. We all have our limits and if the paper comes first, it is much more apt to create a favorable response than if it is number fifteen or number twenty. I hope many of us don't try more than twenty at a single sitting. It also depends somewhat on the prejudiced mind of the examiner. It is hard for him not to lean toward a prejudiced view which he may have on a certain question which may have other answers of equal validity. It depends on whether we are tired or hungry when we read that paper. So, as we follow it through and fill in the details we must realize that such methods are faulty. When you come to check them up with the results shown us today, we realize how unfair the older method is, especially if we realize at the same time that the results of these examinations may make it impossible for a man to go on with medicine; that is, if he fails in too many questions he has to stop, and give up his career. We ought to be pretty sure we are being fair and just in our way of marking.

We are now trying out this method in a good many of the departments and although we have not gone very far, we are enthusiastic and hope to carry it out still more widely.

There is another type of examination which hasn't been mentioned, one that is used in some of the surgical or medical examinations. A

case history is reported in some detail and then, after the full recitation of the history, definite questions are asked, referring back to certain specific points in the history,—“explain the rise in temperature,” and so on. Short specific questions are asked which need definite answers but which can be answered briefly and so, corrected quickly. That has been helpful not only in getting a fair estimate of the amount of knowledge each individual has, but also it tends to accomplish what we think is the next desirable thing and that is, to avoid cramming up before examination. If that is what the speaker meant by “stimulating review,” I think it is one thing we want to avoid; that is, the concentrated review just before the examination. If it is done from week to week and day to day, then it is highly desirable. I hope the result of the experimental work now going on all over the country, not only in medicine, but also in many of the other branches, will bring about a much more fair and just method of testing out the information and ability and knowledge and wisdom that the student has.

DR L. S. SCHMITT, San Francisco: I should like to add our experience to those of the previous two speakers. We have been making a comparison between the results of the discussive type of examination and the short form. The results so far are similar to those which have been reported here. Likewise, it has been found that the grading of the discussive or long form of examination is dependent on many outside factors, such as the time of reading the paper, etc.

However, there is one point which has not yet been touched on and which I think is important, namely the examiner must do his hard work before examination; heretofore, it has been after the examination, in the reading of the papers. With the short form of examination, the greatest labor is in the preparation of the questions. The crux of the short examination is entirely in the questions asked and considerable thought must be given to the selection and phraseology of the questions.

With the discussive form of examination, after the questions are used they are ordinarily thrown away or left to repose at the various fraternity houses. But with the short form, a large number of questions may be kept on hand, say approximately 1,000, and from this list a sufficient number can be picked so that a comprehensive examination can be given to the class which is to be questioned.

DR DAVID L. EDSALL, Boston: I have no doubt there are useful features of this type of examination, but I do feel there is some necessity of being cautious about the use of it, particularly in work such as we are doing, namely, graduate work, with mature students.

The great fault we have had to find, and I think the most commonly mentioned fault, is that students know a great deal of detail,

but comparatively little about putting it together and using it in a connected and coordinated way. This method of examination would tend to emphasize that.

In examinations on courses at the end of courses, this might have some usefulness, even in medicine, but there is a strong tendency to have predominant in the student's mind the matter of detail rather than the coordination of detail, and careful judgment based on connected, coordinated thought. The essay type must still remain, I think, a better method of judging the individual's capacity of that sort.

I am not afraid of the damage done by examiners to the progress of the student's career. We have gone back through about fifteen years, to study the future progress of men who have failed even once in an examination, and particularly those men who have failed twice, examinations conducted with conscientiousness and care, but mostly of the essay type. Practically in all cases we have found that the student's further record in the school, with one or two failures back of him, almost always substantiated the judgment of the examiners. There are very few chances of doing unfair things, so I don't think that element need trouble us too much. Once in a while there may be some injustice but not enough to throw a man out of the school and interfere with his progress.

The main thing in my mind is that there is a danger of introducing what we have been fighting against, the inability to coordinate detail.

DR WM. KEILLER, Galveston, Texas: I want to endorse what Dr. Edsall has just said. I have had considerable occasion to go over our men's careers as compared with their examination results and I feel that in very few cases—very, very few cases, indeed—do we make any serious mistake. The men who make their examinations do all right afterwards, as a rule, and, almost without exception, the men who do poorly, continue to do poorly in after life.

I believe also that the written examination, the essay type, is a wonderful test of the man's mental capacity for arranging his knowledge. As Dr. Edsall has said, a man's capacity doesn't depend on the number of individual items that he has got hold of, but the way in which he can arrange these.

Now, I grant you that there are quite a number of students who have a poor command of English and who do very poorly on that account. We had a very good example of that this year. There was a man who had done well in his clinical work, but who had done so poorly in his freshman and sophomore work that we had to turn him down altogether. It was pointed out to us by reliable authorities that he was an earnest student, but had a very poor preliminary preparation, and his father offered to send him back to take a B. A. degree. He got his degree and came back and did extremely well. That was because he had got better mental training, and I am

rather strongly persuaded that a well-arranged essay type of examination is an excellent test of good mental training.

Of course, you know, a great deal in examiners depends on the mental attitude. There can be examiners who have no discretion, no wisdom, no "bowels of compassion," who do not see anything further than the mere answers to the questions. Now they are an incubus on a medical school, and it is very difficult to get rid of an incubus. But, given a reasonable amount of judgment on the part of the examiner and a great deal of honest work before the questions are prepared and I do not believe our old essay type is so bad, after all.

I am afraid I am ultraconservative, but the conservative element is of some use sometimes.

DR FREDERICK T. VAN BEUREN, JR., New York: The objections that Dr. Edsall voiced were the ones some of us voiced when Professor Wood first asked us to try the experiment of using this type of examination in the medical school. We felt that this examination gave no opportunity for the students to indicate their ability to correlate knowledge and to judge the way by which it should be applied.

Professor Wood assured us that from their experience at the college, there was a very close correlation between the individual student's knowledge of facts and his ability to judge between the facts, and while we did not accept that assurance entirely as applying to medical work, we felt it was perfectly justifiable to try the experiment, and some of us have tried it in a more or less half-hearted manner, adding to the new type examination two or three essay questions of the old type, in an attempt to check up how the handling of the essay type compared in each individual with his handling of the new type of examination.

There is one real advantage in the new type of examination and that is that it enables one to sample very much better the student's knowledge of the subject than the essay type does. Whereas in the essay type, if a man fails to give the right answer to, say, five out of ten questions, he does not pass the examination; in the new type he has a very much better chance, because he may have 120 or 220 questions instead of ten.

We tried it out in surgery last year where we had a course in which six different men taught a different branch, and each man supplied thirty questions and the student was given those questions to answer by plus or minus. We found the results correlated very closely with the essay type of examination that they had had monthly in different parts of the same course during that year.

DR E. S. RYERSON, Toronto: I think one of the chief points we should realize in considering this question is that the advocates of the new type of examination are not suggesting that it should replace

the essay type. All the publications which I have read describing it have emphasized that it is merely a supplement to that and should be used only in that way. We should still continue to get the value of the essay type and find out whether the student has the ability to organize and correlate facts, and in that way test that type of knowledge.

The result of the experience that I have had with trying this examination during the past two years has been to show the weakness of the student's knowledge of certain things which every one assumed he knew.

One or two instances will illustrate what I am trying to show. One was the type of material which was to be used for ligating blood vessels, and out of a class of 124 men, 24 suggested they should be ligated with silkworm gut. Another one was in connection with hernia where they had special classes in minor surgery and technique throughout the session, in which only about 25 per cent were able to describe the technique, the method, in an ordinary type of hernia.

From the standpoint of teaching, it seems a very valuable thing throughout the session as a term method of examination. This system should be given every consideration and tried out by the members in different parts so that a summary may be made in two or three years and possibly in that way we can get farther ahead and make our methods of testing students more objective and less subjective.

DR IRVING S. CUTTER, Chicago: The oral type of examination should be mentioned, as having a vital and important value. While the oral examination may appear tedious, the net result is a more accurate estimate of the student's knowledge. There is frequently a real saving of nervous energy as there are no long illegible essays to grade. Many students respond better to the interview type of examination.

DR. HUGH CABOT, Ann Arbor, Mich.: We have had some experience at Michigan with the method of procedure described. I think the thing that drove us to it was the vote of the faculty establishing the number of "D" marks which a student might receive and stay. Then it became evident that we must establish what was a "D", and we found a "D" was an extraordinarily variable thing. We studied the behavior of examiners under the strain of marking examinations. We found in some examinations that the marks became steadily higher, and sometimes it would be the reverse, so that evidently fatigue in the examiner is a very uneven thing.

It seems to me that at this time more than at any previous time, we are required to select our students with the greatest possible accuracy. A student who is to be ultimately excluded from the practice of medicine—and dropping him from the school practically amounts to that—should be, in everybody's interest, excluded at the earliest possible moment. To do it in the sophomore or junior year

is a very serious blow, if it could have been done before. I doubt whether an incomplete medical education is of any substantial value. I am not sure it is not a positive damage. It is essential that we should be as accurate as possible.

In experimenting with these types of examination, and we have used all here shown and some others, we have come to believe that when a considerable amount of knowledge of facts is required, they do enable us to eliminate the tiring qualities of the examiner.

As has been pointed out, there is no reason why this method of examination should be substituted for any other method. Clearly the essay type of examination gives us important evidence as to the command of English which I believe is important for a man who is to practice medicine. It is not necessary to substitute one for the other, but I do believe that as people concerned with the rating of students, we must be as accurate as possible and occasionally, perhaps often, the hit or miss methods of the past will in the future become more serious as we must rate our students earlier and with greater accuracy. It is a calamity to drop a student late in his career.

DR W. T. SANGER, Richmond, Va.: May I suggest one point in connection with this, since I am a school man and not a medical man, now joined with the medical forces as an executive. Whether this new type of examination measures the ability of the student to organize and apply his knowledge, and every one has stressed this as fundamental, depends on the type of new examination which is selected and the manner in which it is built. If the completion test which Dr. Traube mentioned is employed, for example, and the questions are built in such fashion as to require the student to show that he can apply and organize his knowledge, then the test can be made good measure of that ability; and I believe any one familiar with this type of examination, that is, the completion test, is likely to realize that it can be so fashioned that it will measure the ability of the student to organize and apply his knowledge.

DR. WILLIAM DARRACH, New York: I would like to add a word as to the experience at the law school of Columbia. Their objections were more serious than ours; that is, the ability to test the coordinating powers of the student, and especially his judicial application of these coordinated ideas. The method has been worked out to such a degree that I think a large majority of the faculty are satisfied with it as a test of those points.

One other thing, I think we ought to hesitate to favor or condemn the method unless we are willing to try it pretty thoroughly, instead of just trying out "Yes and No", and saying that it is a washout and we will have nothing to do with it. It should be done fairly and thoroughly, and the methods applied to the exact needs of the department which is to use it. No two use it exactly the same way.

I think it is a far better test and a better estimate of the student's ability than any previous method, but I should also still cling to a small amount of the essay type.

DR DAVID L. EDSALL, Boston: I should like to emphasize what Dr. Cutter said. I was examined as a medical student by oral examination, hardly at all by written. I have never lost my faith in the oral examination as being the keenest method of estimating a man's value. We are increasing our use of it constantly and increasingly we are having examinations given by trained examiners. Unless the examiner is trained, his examination is likely to be no good, and that, perhaps, is the most important thing of all to be said about examinations.

I can't see that these new tests will ever get at the real essence of a man's value. It lies in two things, this determining a man's value. Has he acquired the knowledge necessary, and how has his personality reacted to it? The farther you get away from personality, the farther you get away from justice, and the farther you get away from his personal power. That is the point which makes me feel such tests must be of minor rather than major significance.

The closer you can come to a student, the better you can judge him, and the oral examination comes closest of all, and helps best in judging his capacity in relation to the knowledge.

Of course, you could learn certain things without any examiners at all. You could merely make out questions and have students punch cards and then let a sorting machine go over the cards and tell you the student's rating, but I feel we must keep some contact with the individual in determining what the individual will be in the world. (Applause.)

DR C. SUMNER JONES, Buffalo, N. Y.: There is just one point which I have noticed so far that has not been mentioned. I feel that a reading of a large number of papers sometimes affects the rating of individual students in the class. Where a student's grade on examination is in question, it seems to me it is only fair to the student that the paper should be rated by more than one instructor, without knowing the marks of the other.

For instance, to illustrate the point—in medicine, where medical problems are given in final examination, I believe that the interpretation of the student's knowledge by a single instructor is not always accurate or fair. If the paper is read by a group of clinical men who have been teaching similar subjects and have the composite whole in mind—the professor of medicine, the associate professor, and two or three others in the department—as is the common practice in our school, and the average of their ratings used, I believe the student is likely to receive a fairer estimate of his ability as shown in the examination, than he might receive if the paper were read by only one instructor.

DR. C. A. HAMANN, Cleveland: I should like to add my testimony to the value of the oral examination. I was brought up on it and believe it to be the best. One cannot estimate by the written method alone or by the newer methods just described the fitness of an individual; furthermore in the examinations in medicine and surgery a practical examination at the bedside is essential in order to ascertain the qualifications of the candidate and to properly judge of his attainments and ability.

DR. C. C. BASS, New Orleans: I wish to ask whether Dr. Trabue thinks there is a greater probability of fraud in examination with the newer method than with the essay method.

DR. W. F. R. PHILLIPS, Charleston, S. C.: This seems to be an "experience" meeting. I was brought up on the oral examination. I have tried the essay examination without the oral examination. I have come back to use both the essay and the oral examination. My judgment of the man is based upon the oral examination and not upon his essay.

The essay is very good for some purposes, but the oral examination is the one I estimate the man's ability by, and I would rather have it than all the other examinations I can think of.

DR. RAY LYMAN WILBUR, Stanford University, Calif.: I would like to point out that all the evidence commending oral examinations has come from those who have survived such examinations.

DR. M. A. TRABUE, Chapel Hills, N. C.: I tried to make it clear that all we suggest is that you experiment and keep accurate records of what happens when you use the various types of examinations. I am sure the oral and essay types must continue, and these others are simply to be used to supplement them.

There is one point we ought, perhaps, to say a little more about. With the essay type of examination the instructor was required to read the papers very promptly after the examination. He did all of his work immediately, and that was the reason for the great fatigue connected with it. The new type examination does not relieve the instructor of work. I am inclined to believe that if you wish to get a measurement of the student's ability to organize and correlate his facts, you can do so by these questions. You can arrange it so that he has to organize his facts. It will add to the work of the instructor, but he can distribute that work before the time of the examination rather than wait until after the examination.

This is not a method of saving time or labor, but it is merely a device for getting at certain facts somewhat more objectively than we have previously done it.

one could lay out one thousand or perhaps two thousand facts that are

As to the question of whether or not it is possible to cheat, I am

certain that it is. I suspect that in any particular semester course, taught, or supposed to be taught, and beyond that, the knowledge of the student would not extend. If the student gets all the two thousand facts crammed into his head and can organize them properly, he can probably pass the examination better than otherwise; but perhaps that is what we try to do when we give him instruction.

THE TECHNIC OF TEACHING AS APPLIED TO MEDICAL TEACHING

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In all branches of education, especially in public education, there has been developing an appreciation of the necessity of greater efficiency in instruction. Even the layman does not hesitate to criticise in the harshest manner the results in the case of the individual, of the method of instruction which has been used in his formal preparation for the activities of life. This caustic criticism has not been confined to any department of education. All divisions of education, kindergarten, elementary, secondary, higher and professional, have been attacked as not giving to the students the effective type of training to which they theoretically are entitled. It is noteworthy that among those most severe in their strictures upon education are found almost invariably those most directly responsible for the organization, administration and supervision of the work. To the philosophic observer of the educational field, this realization of the inadequacy of the present organization of education is most encouraging. Of all the obstacles to educational progress, the most dangerous is that of complacency as to present conditions. The fact that a subject of this character has been placed upon the program of this Association affords another evidence of a professional attitude towards the problem of medical teaching which however inadequate the suggestions presented today may be, assures in the long run increasing effectiveness in the work of this most important branch of professional education.

The criticism which has been applied to education in general concerns almost every branch of the subject. It has included the problem of the fundamental equipment necessary to secure adequate results, the content of the curriculum of instruction, the character of the tests used and the general professional equipment

of the educational institutions under discussion, the academic and special training of those charged with instruction, the analysis of the various types of instruction used, and their relative significance in the various levels of instruction. It even has entered into the detailed study of the elementary mechanics, which make instruction more significant, and has considered the relative significance of such mechanics upon these levels.

In all applications of the technic of teaching, either elementary, secondary or higher, the fundamental purpose is the development of intellectual power. Naturally, the method by which this power may be increased is modified from year to year on account of the developing physical and intellectual maturity of the individual and the increasing amount of knowledge secured through the totality of his contacts. At some place in his educational preparation, the acceptance of specific information constitutes the element of greatest significance; at other times the technic must be of such a nature that he secures training in the organization of material already in his possession; at some other period the significant element of technic may have to do with the method by which valid judgments may be secured, and at other points in his preparation the vitally important thing may be the method through which accurate and reliable application of general principles previously mastered are secured. In a similar way the relative importance in the equipment of the instructor of so-called educational method or technic as compared with the importance of a thorough mastery of the subject instructed, varies with the advancement of the individual in his training for life, and in the later years of his training, with the character of the courses studied or the profession for which he is preparing.

During the last twenty-five years we have seen vast improvement in the work of the medical colleges of the United States. In fact, the forward steps have been so great as to be almost startling. Probably no other type of education has improved so much, either relatively or absolutely. This advancement has characterized the whole field of medical instruction. It includes material equipment, the curriculum, the pre-medical work, the preparation and equipment of the instructors. Marvelously improved clinical facilities have been secured and advances in the effectiveness of clinical instructions have resulted. From the

standpoint of genuine educational progress, those responsible for the administration of our medical colleges can not be too highly commended. The results of such a remarkable advance in the efficiency of medical instruction would be, however, far more significant if it were not true that the preceding level of efficiency was disgracefully low. It has been possible to accomplish absolutely tremendous improvement and yet have not reached a level of efficiency which the importance of the medical profession justifies. As already indicated there does exist a widespread conviction on the part of those concerned in medical instruction that great changes are still necessary, in the preliminary preparation of the students, in the organization of the materials of instruction and in the technic of the instruction itself. Our better medical colleges are now requiring a preliminary course after the completion of graduation from high school, of at least two years of college work and this work emphasizes very properly instruction in chemistry, biology and physics. This, together with a reasonable amount of work in English and foreign language, constitutes the major portion of the so-called pre-medical work. Some of the colleges have preliminary work required of a decidedly higher character. Presumably, as time goes on and the number of candidates for entrance to medical colleges increases, further pre-medical requirements will be established. Those desiring the best possible training for our physicians and surgeons are justified in using as much influence as possible towards the hastening of the time when that higher standard may be enforced. From the standpoint of technic, the problem of the raising of the pre-medical standards is of genuine significance. In the first place, the group becomes more highly selected and presumably better able to do a high type of work in the medical college. Also the increasing of the period of preliminary preparation results in the average incoming medical student having a higher intellectual maturity. Inasmuch as the technic of instruction is always modified directly by the maturity of the student, the significance and importance of changes looking toward greater mental maturity is evident.

The child must have his work carefully supervised; he must be told when to study, what to study, and how to study; he must be given specific instruction as to the particular kind of study

necessary to accomplish the particular task. The high school student, again, although far more independent and more able to do unsupervised work than the young child, is still given supervision. Rules and regulations of all types are enforced for the primary purpose of making him do his work in such a way that progress may ensue. We even find, although I greatly regret that it is undoubtedly necessary, a considerable amount of this elementary type of supervision in the freshman and sophomore years in our colleges and universities. Here, again, we find various devices resorted to to insure regularity of attendance and sufficient study to keep the student from neglecting his work. The extent to which our colleges find this type of somewhat specialized supervision of the work of the students necessary indicates the degree to which secondary education has failed in securing the independence of outlook and maturity of judgment, which in theory should have been the fundamental objective of his high school course. When we reach the opening year of the medical college, as we find it in the typical institution at the present time, the student certainly should have passed out of the period of adolescence into that of intellectual maturity. His training should have been of such a character as to enable him to organize his work economically and to make valuable use of his time for the study and research which is at his disposal. Too often, due very largely in all probability to the tremendous increase of students undertaking higher education, at the end of two years of so-called higher education, he still has failed to secure seriousness of purpose and a feeling of genuine intellectual responsibility towards his work. This has proved a handicap to the most effective type of teaching. A serious question to be finally determined is whether it is one of the responsibilities of the junior faculty of our medical colleges to nurse these immature and apparently irresponsible students through this period of preparation to prevent their falling by the wayside, as they otherwise assuredly would do. The answer to this question will have its effect in modifying the method of technic of instruction to be used with them. If, in the best judgment of those most intimately concerned with the training facilities, it is worth while to devote a large amount of energy and time to a type of instruction which is highly justified in the high school and perhaps is justifiable in

the first two years of the college, then we need to include that expenditure of effort as one of the necessary parts of a successful technic in medical instruction. If we come to the conclusion on the other hand, that the junior faculty of the medical college has a right to assume reasonably complete intellectual maturity and a genuine appreciation of individual intellectual responsibility, much less attention need be given to devices which are intended to force the student to study and to maintain from day to day definite standards of work, and more attention can be given to the presentation and organization of the work in such a fashion that the intellectually mature student can secure the fundamental material that he needs in his work, through which he can properly organize this material, can be stimulated to develop logical and practical judgments on the basis of his organized material, and can be given opportunity for making a practical application of these judgments based upon this definite knowledge which he has learned how to properly organize.

Assuming, then, that there is a satisfactory degree of ability and previous preparation on the part of the student, what can be said concerning the technic of instruction as applied to medical teaching? It is fairly obvious that the aim of instruction is bound to have a major influence in determining the technic to be used. It is also obvious that the attitude of the student himself, or the attitude of the student body as a whole, must determine to a major degree the type of technic to be employed. Whether or not the student is as intellectually mature as the teacher desires, the skill and enthusiasm which the teacher possesses will influence greatly his intellectual responsibility. While in most of the courses there is a reasonable amount of subject matter which must be secured through text book study and which must form a part of his definite stock in trade, yet from the nature of the profession for which he is preparing himself, a very large amount of his instruction must come under the general head of laboratory instruction.

Perhaps, less than in almost any other type of higher education can there be found a very legitimate place for the so-called didactic lecture in a great majority of the courses found in the medical curriculum. While there are some topics in many of the courses which demand an elaboration or simplification, as the case

may be, of the material available to the student in the books and literature accessible, any absolutely unnecessary extension of this type of instruction is undesirable. In the actual work of instruction, the temptation on the part of the instructor to take this, which seems to him a short cut to the goal desired and a desirable method of securing economy of time and effort, is often too strong to be successfully resisted. This temptation to introduce what might be called a modification of the didactic lecture, may be found even in a clinical demonstration. Here a small group of advanced students observe the work of the instructor, who is very likely a distinguished practitioner. Such an instructor is not unreasonably proud of his skill in diagnosis and in the mechanics of the specific operation to be performed. It is for him a very real satisfaction to be able to discourse brilliantly upon the situation which is presented, rather than to use the situation as an opportunity for developing on the part of the students themselves the ability to reach correct conclusions and to form accurate judgments as to the type of operation or treatment necessary to obtain the desired results. To use the latter method requires ingenuity and patience, and a suppression on the part of the instructor of his own ability to explain so accurately and ably the conditions existing, the type of work necessary for success, and the probable complications which will be found later.

If the beginning student has been fortunate enough to secure reasonably effective preliminary training, the instructor in medicine has a right to assume that he comes prepared to observe accurately the situations which present themselves in his work, that he has learned how to gather together the facts secured from observation and how to give the consideration necessary to enable him to formulate properly the problems presented for solution, and that he also has learned as a result of his previous training how to derive judgments based upon the conditions in the particular problem before him which will result in his applying to these conditions the fundamental principles which must be used by all who work successfully towards valid conclusions. I say that the instructor has a right to assume that the student has had this training. He has not, however, the right to assume that this training is of such a character that the instructor can afford not to produce situations which will enable the student to secure re-

peated opportunities for developing skill in this intellectual attitude. It is vitally necessary that the instructor continually remind himself of the fact that further training and practice in this type of work is in many of the courses a major purpose. The student will be able to develop into a competent physician whose judgments may be relied upon only to the extent to which he has secured skill in this method of approaching judgments. It is, therefore, vitally important that he be placed constantly in situations which will give repeated opportunity for this training

Medical science is based fundamentally on the general scientific training and knowledge secured from the preliminary medical courses in chemistry, zoology, physics and botany, of the freshman and sophomore years of the university. Upon this is superimposed scientific training in anatomy, physiology biochemistry and the other sciences taught by the junior faculty, preliminary to clinical training. If the most effective use of the knowledge acquired in these fundamental sciences is to be secured, the work in the clinical subjects should continually recur to the knowledge presented in these preliminary sciences. The real hope for fundamental advances in the science of medicine depends upon the effective use of these sciences. If, as too often happens, clinical instructors themselves have lost their own appreciation of the vital connection which medical science has with fundamental scientific knowledge, the persistent neglect of the utilization of this body of knowledge and skill acquired in the earlier years of the medical course, will result in the eventual graduation of students perhaps reasonably well trained for usefulness as general practitioners, but lacking the development of habits of persistent application of scientific knowledge to new conditions, which is the essential attitude of the medical investigator. In other words, a failure skilfully to correlate the more general scientific knowledge with the work in the special medical science will tend to lessen the output of genuine medical investigators upon whom depend the major portion of genuine progress in medical science.

How to secure such satisfactory correlation is not easy to determine. Successful practitioners upon whom at the present time depends the major portion of effective clinical instruction are not ordinarily scientific investigators. The whole organization of the medical profession does not lend itself easily to the

training of individuals who maintain consistently the scientific attitude towards their work. The immediate financial rewards for those desiring to be investigators and students of medical science rather than successful practitioners are so meagre as compared with the financial returns if they go into practice that few can be tempted to remain loyal to their original ideals. Separation from active participation in scientific research over even a small number of years produces an attitude of mind towards such work which in the majority of cases will effectively prevent the resumption of genuinely close connection with and knowledge of science on the part of this group of our medical faculties. Theoretically, we could say, it is a duty of those in charge of the organization of faculties of medicine to employ only those who are skilled instructors, industrious investigators, and genuine scientists, but the administration committed to such ideals ordinarily will find it absolutely impossible to maintain them consistently or effectively. The brilliant investigations and the far-reaching significance of the work of such a group of men as those associated with the Rockefeller Institute for Medical Research will doubtless stimulate more of our young men of scientific inclinations to devote themselves from the beginning of their work in our medical colleges to preparation for such activities, but unless the differential in material reward comes to be less emphatically in favor of the practitioner as compared to those devoted to investigation, comparatively little in the way of improvement in the training and attitude of our medical faculties will develop. It is even doubtful whether the consistent following of the policy of securing only full time instructors can result in the attracting into the faculty of men of as great efficiency as practitioners as can be secured by the part time method. There is room, however, for general discussion as to whether a man of mediocre ability and skill as a practitioner, if he has the right attitude toward teaching and has had the proper training for proper instructional work, may not do a more satisfactory type of work for students than will the practitioner of great eminence, when from his point of view the instructional activities are of minor importance and even in some cases carried on because of professional contacts and acquaintances which may be of practical value to him in later years.

Very probably the most important division of the work in any well conducted medical college centers around practical exercises which the student must work out for himself. Much of this type of work is found in the first years of the medical course, although there are opportunities for really independent exercises in the clinical subjects. This kind of work is of essential importance in the development of the type of powers already mentioned. If these practical exercises are properly performed, there is no doubt that they will be invaluable in securing independence of judgment and skill in the assembling of essential facts. The great danger in work of this sort is that, due to a feeling of limitation of time on the part of both the instructor and students and especially on account of the tremendous pressure of the medical curriculum as a whole, the conditions of the practical exercises may be worked out altogether too carefully and too much in detail by the instructor in charge of the work of the student. It is true that when much of the preliminary work is done by the skilled individual and only a limited number of specific activities remain for the student to perform, the successful completion of these exercises can be accomplished in a very little time. But while there is a great value even in work of this sort, the fundamentally effective training which is the real purpose of such exercises is largely lost. The facts actually learned in connection with successful performance are of little importance and might be secured didactically in a few minutes. However, the attitude and the intellectual habits developed are really all that justifies the exercises. The instructor, then, should, if his technic is to be most effective, realize the necessity of leaving as much as is possible to the initiative of the student himself, and then, if the whole work is organized for the purpose of developing confidence of attack and accuracy and promptness of decision, the student is rapidly acquiring the intellectual point of view essential for success. In medical teaching as in all forms of advanced teaching, there is little value in spending much time on securing knowledge on the part of the student of the general process upon which the work is based. Here is a case where economy of time is essential and it is one of the few places in the work of the teacher where emphasis upon exposition is absolutely defensible. The good teacher, however, even in such cases strives to present his ex-

position in such a way that passivity of mind on the part of the student is minimized and active intellectual participation is secured. The skilful application of the Socratic method at such points is effective, but this should not be resorted to if the principles under consideration are easy to understand and if the Socratic method could not develop them without undue sacrifice of the time of all concerned.

When we reach the clinical work we have for our most effective technic of instruction a combination of suggestive questions, valuable explanation and skilful demonstration which, however, reaches its highest effectiveness only when used with very small groups. The extent to which this technic can be utilized in a given medical college depends upon the amount of clinical material available, the size of the instructional staff, and the number of students entitled to receive this instruction. Here is where our medical colleges have made perhaps their greatest strides in efficiency in the last twenty-five years. Clinical facilities, under absolute or sufficient control of the faculties concerned, are much more adequate today than they were only a few years ago. In the extension of the amount of clinical facilities absolutely under control of the medical college lies the hope for continued advancement in general efficiency of instruction. The well equipped medical college, therefore, affords opportunity for clinical work taken by the student in connection with a small group of other students. If this work is properly carried on, the intellectual methods demanded are always strictly analogous to the practical exercise in the laboratory. The problem is there, a very definite one. The skilled clinical professor tries to see that the student himself so far as possible determines exactly the conditions of the problem and again so far as possible with the specific subject, the professor indicates the most desirable procedure. The last step in work of this sort is, because of the necessary obligation to the patient, deferred until the period of internship and even there the same obligation frequently may prevent the completely independent solution of the problem with its attendant responsibilities. As indicated earlier, the chief danger in this type of work is that the demonstration shall be kept too completely in the hands of the professor. When properly conducted, however, the value to the student in the practical

application in the skills and knowledges secured in the preliminary training of the college is of the greatest importance. Here is really the culmination of the preparation which he has been receiving. His eventual success, either as a research student or practitioner, is going to depend very largely upon the ability with which his preceding training may be used in the constantly changing conditions presented at the bedside. In this work, all of the technic of instruction, all of the fundamental principles which are utilized in successful laboratory work, save individual participation, may be utilized. It may be helpful to emphasize the very close analogy between this type of instruction and the occasional demonstrations which the instructor in the laboratory course feels obliged to give either on account of complexity of the problem or the value and scarcity of the materials to be used. Where the clinical instruction is organized in this way, even the more formal demonstrations where the entire process is developed through the activity of the clinical professor and where the student is merely an intelligent interested onlooker is greatly to be preferred over the large demonstration lectures which, on account of lack of facilities, so frequently are found necessary. The closer contact develops greater interest, the opportunities for a passive neglect of scientific observation are definitely minimized and the value of the demonstration to the students concerned are greatly increased.

Reference has already been made to the futility of any extended use of the didactic lecture as an implement of instruction. This type of instruction is in disfavor by experts in education in all branches of education, although the opportunities for a reasonably valuable use of the lecture are far more frequent in advanced than in elementary instruction. The temptation, through the insufficient instructional staff, for increasing the amount of lecture work is frequently very great. There are a few types of work which in my judgment definitely justify the lecture. Where the lecturer is able to make an unusually desirable presentation and where his personality is of such a character that the attention of the individual students is easily secured and retained, the possibilities of successful work are greatly increased. There are some types of historical backgrounds which it is of value to all students of medicine to possess, which through such a forceful personality may be secured at a minimum of time and effort. There also

exists, thanks to the wonderful advancements which have occurred in medical science in the last generation, numbers of specialists who have such unusual skill in certain phases of medical knowledge that they are able to lecture on subjects based on their special knowledge in such a way that the materials which they present and the inspiration which radiates from their brilliant achievements are eminently worth while to the students. Such lectures, however, should never be considered as fundamental or concerned with subjects adequately treated in the general curriculum, but should be confined to the narrower phases of medical knowledge which can not receive any emphasis in these general courses.

The problem of the inefficient student is perennial. We have it in all branches of education. A favored subject for discussion for professors of liberal arts colleges when getting together is how can we modify conditions so that we will not be handicapped by individuals who have not had satisfactory preparation, who have not sufficient ability, nor worth while attitudes towards the education which they are nominally trying to secure? The same problem is found in medicine. Presumably the proportion of students whose attitudes are wrong is smaller than in liberal arts colleges because a greater percentage of the students attending medical colleges are seriously anxious to prepare themselves so that they may become successful practitioners. The proportion, however, of those whose preliminary preparation is insufficient and those whose intellectual abilities are not entirely adequate is presumably as great in this group as in any other group of corresponding intellectual maturity. The problem, therefore, is urgently vital in medicine. While no panacea for this situation can be described which can be effective, two attitudes toward the poor student can be suggested. Those in charge of the administration of medical colleges can insist on better preparation for students. This insistence is not necessarily going to be effectual. The state universities so far have felt that it was impossible to exclude from the freshman class students who have apparently successfully completed their high school work. While the efforts of university faculties to secure better trained freshmen may eventually improve the input and while the conscientious efforts of the army of high school administrators and instructors to improve the char-

acter of their work and therefore the preparation of those leaving high school for college may eventually produce a better situation, the medical college, like the universities in general, is compelled in the last analysis to receive students with the average preparation which two years of university training secures. This, of course, does not imply that the requirements for admission to our medical colleges should or should not be made more extensive than they are at the present time. Personally I am inclined to think that they should be made more extensive, and that rapidly we are approaching a time when our colleges will greatly increase the amount of preliminary training because the pressure on the part of those wishing admission into our medical colleges will become so great as to be really embarrassing. The other attitude, which I am coming to think is reasonable, is that the medical college has a right to assume that the student with an average of fourteen years of academic preparation should be able in that period to have developed a sincerity of purpose and a willingness to work for the knowledge and training to be secured by him without undue pressure upon him from his instructors. The technic of instruction which it is justifiable to demand in medical instruction includes the proper presentation of conditions for growth, the proper stimulation for work of a high order, and the opportunity for securing promptly and reliably the specific information and equipment necessary for the development of the knowledges and skills desirable. That group of our individuals who prove to be incapable, whose sluggishness of mentality is unpromising, who are lazy or indifferent and whose lack of seriousness results in the apparent necessity of disciplinary measures of one kind or another, should in my judgment receive scanty consideration from our faculties.

There remains in any adequate discussion of the technics of instruction in medical colleges the consideration of the means, if any, which may be utilized to secure instructors in the colleges who themselves have been trained in the technic of instruction, as distinguished from the general professional preparation needed to make them able intelligently to oversee the work of their students. We also have an important problem, as yet almost untouched, of how systematically to improve the actual instruction of the medical instructors now in service. Both of these problems

have been considered only sporadically. Those responsible for the administration of higher education have been in most cases unwilling to accept the responsibility of securing improvements in teaching and not infrequently actively antagonistic to the idea that special training in how to teach is necessary or even desirable. We are rapidly, however, reaching the time when our university presidents and those most competent to judge of the general efficiency of the instruction in these institutions will realize that there are very real wastes of energy and effort and that the outcome on the part of the students is more satisfactory than it would be if the instructor possessed a better technic.

The development along this line of thought is seen in the increasing number of courses aimed to improve present conditions, now offered in colleges of education which are closely connected with large graduate schools. These courses are courses in method, in which the problems considered have to do with subjects on the college level and the examples for discussion and the observations insisted upon have to do with work of college grade. Such courses are designed primarily not for graduate students in the department of education, but for graduate students in other lines of work who, while looking forward to the teaching of these subjects, have not as undergraduates taken the traditional courses in methods of instruction and have not had practical experience in teaching.

While there is no fundamental difference in the general principles which are presented in such methods courses from those where they have to do with secondary education, yet the practical application is necessarily modified because of the greater maturity of the students taking the course and the greater maturity of the students, the technic of whose teaching is under consideration. A development of considerable magnitude along these lines I am confidently expecting to occur in the next few years. I believe that we are fast approaching the time when the belief that method in presentation and skill in instruction depend merely upon adequate academic preparation will have been definitely abandoned by those directly responsible for the efficiency of instruction in colleges and universities.

When we come to apply this principle to the preparation of the instructors in medicine, we are confronted with obstacles

which seem almost insurmountable. In the first place, practically none of the students in the medical colleges have any notion whatever, while students, of becoming instructors in medicine. They would have no interest whatever in methods courses and if these courses were offered as optional courses for those desiring to prepare themselves for instructors, the number electing them would I believe, be negligible. If I am wrong in this assumption and there really are a reasonable number of students who would welcome these courses, it might be possible for a number of these colleges which are connected geographically with universities to have specific courses in the technic of instruction organized for the benefit of such students. It is quite apparent that no medical school could expect to use the entire time of such an expert unless he happened to be able to devote the rest of his time to some of the regular courses of the medical curriculum.

The other problem, that of having a systematic method of improving the instruction of those in service, while extremely difficult is not, theoretically at least, impossible of solution. In elementary and secondary schools the conception of a supervisory expert who has a background of training and a quickness of intellectual adaptation has been generally accepted. Experience is proof that while in many cases such individuals have not been as effective in supervision as in theory they should have been, there is being developed a group of genuine experts who can intelligently and scientifically improve the work of instruction. Our colleges have not developed any such officers, save in a few instances. We do find a few cases that officers of instruction have been appointed in universities to whom has been entrusted the general problem of securing greater efficiency on the strictly educational side of the work. There is little doubt that within a reasonable time we shall see such officials appointed. They may be called deans, or they may have other titles, but in any event they will be individuals of high rank and authority, who will have a far more definite responsibility in general educational efficiency than is now assumed either by deans of colleges or heads of departments.

In my judgment, it will be possible to develop in medical colleges, as in other institutions of higher education, individuals who may have capacities and backgrounds enabling them intelligently

to oversee the actual instructional work going on, and with sufficient authority and dignity of office to effectively secure improvements where needed. That this involves an almost revolutionary change of attitude in higher education is frequently admitted. The tradition in most institutions is that the heads of departments or deans should not visit the instructor in order to observe his weakness or strength. This convention will have to be thoroughly abandoned as have similar conventions in elementary and secondary schools. While extremely difficult to bring about both on account of complexity of training and the rarity of the intellectual capacities needed by an official of instruction, the task is not impossible and will be effected after those responsible for the general administration of medical education are as convinced of the necessity of such supervision as are now the administrators of our public school systems. Certainly it is not too much to hope that in the years to come in connection with the still increasing efficiency on the equipment side of medical education, with larger, finer and more adequate laboratories, with ampler clinical facilities of all kinds, with a larger proportion of genuinely scientific investigators found on full time service in the medical faculties, there may develop also an appreciation of the necessity of skill in instruction and of continued and conscientious oversight of the character of the instruction being offered.

IMPRESSIONS ON MEDICAL TEACHING GAINED
FROM TEN YEAR'S EXPERIENCE WITH
NATIONAL BOARD EXAMINATIONS

J. S. RODMAN

National Board of Medical Examiners

I welcome this opportunity to express to the members of this Association the gratefulness of the National Board of Medical Examiners for the encouragement and cooperation that you have so universally given to it. The Board fully realizes that without your moral support its path would have been much more difficult; even impossible. I wish to express the hope that the Board may have this support and encouragement in its greater usefulness which we believe is only now beginning.

Your Secretary has assigned to me a subject which is wholly congenial because the National Board desires, above all things, to help in the field of medical education. As its work has developed in these first ten years of its life this possibility has gradually grown until now it has assumed, to the members of the Board at least, an equal importance with attempting to standardize medical licensure. The Board appreciates the difference between these two and is entirely agreed with most of the members of this body that the word "standardize" has been done to death insofar as medical education is concerned. We fully appreciate that each school represented in this body has its own problems and that it is latitude which is required and not standardization in actually teaching medicine. But in order to secure safety to the whole people of this country, an irreducible minimum of accomplishment must result from such teaching and it is, therefore, with this result that the National Board has concerned itself.

We fully realize that this Board, even after ten years, is young in this work and that these experiences have furnished impressions which are in no sense infallible. We present them to you for what they may be worth.

While the majority of you are familiar with the plan of examination of the National Board and, in a general way, the

results obtained so far, some may not be and so I have thought that it would be well to summarize these results here before attempting to draw any conclusions from them.

This Board began its actual operations in 1916, after a year devoted largely to organization and seeking the endorsement of various bodies, particularly interested in its work, as a voluntary body whose purpose was to establish a national standard qualifying examination which might safely be accepted in all of the States of this country, and abroad, as attesting to ones fitness to practice medicine.

ORGANIZATION—Founded in 1915 by Dr. William L. Rodman. Comprises 21 members serving terms of six years each.

Six members represent the three Federal Services including the Surgeon-General of the Army, the Surgeon-General of the Navy and the Surgeon-General of the U. S. Public Health Service.

Three members represent the Federation of State Medical Boards of the United States.

The twelve remaining members are appointed at large.

PURPOSE—To establish a national standard qualifying examination for entrance to the practice of medicine.

This examination to be of such a character that successful candidates, through the cooperation of the State Medical Boards and Foreign Boards may be safely accepted for licensure to practice medicine.

RECOGNITION—The National Board's certificate is recognized by the following:

Medical Boards of 33 States: Alabama, Arizona, Colorado, Delaware, Georgia, Idaho, Illinois, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Nebraska, Nevada, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, Washington, Wyoming.

The Chief Health Officer of the Canal Zone; the Medical Board of Porto Rico; the Mayo Foundation,

Rochester, Minn.; the American College of Surgeons; U. S. Army; U. S. Navy; U. S. Public Health Service.

Foreign Recognition—Conjoint Board of England; Triple Qualification Board of Scotland.

ENDORSEMENT—The National Board's plan of examination has been endorsed by the following:

American Medical Association, Council on Medical Education of the American Medical Association, Federation of State Boards of Medical Examiners, American Association of Military Surgeons, Southwestern Medical Association, Mississippi Valley Medical Association, Clinical Congress of Surgeons of North America, Western Surgical Association, Southern Surgical and Gynecological Association, Southern Medical Association.

PREMEDICAL REQUIREMENTS—Candidates for the National Board's examination must be students in Class A medical schools or graduates therefrom.

Candidates must have had the following premedical education:

- (a) A standard four-year high school course.
- (b) Two years of acceptable college work, including physics, chemistry, biology and a modern foreign language.

The first five years was its trial period and during that time an examination covering the entire field of medicine in written, clinical and laboratory tests, was given. This examination was only conducted in one medical center at a time with local members of the profession appointed temporarily to assist the members of the Board. On this plan of examination 325 candidates were examined, of whom 269 passed and 56 failed or 22 per cent of failures. It must be remembered that two years of this time included the war period and were largely lost in furthering its development. After five years the Board believed that the idea of a national qualifying body was sound and so a plan of examination was evolved which would include the entire country, and it is this plan under which this Board is now working. This examination now comprises three parts, each to be taken separately and in order.

PART I. The N. B. Examination comprises three parts, each to be taken separately and in order.

Part I may be taken by candidates who have satisfied the pre-medical requirements and in addition have completed at least 2 years in a Class A medical school.

Part I consists of a written examination in each of the six medical sciences: Anatomy, physiology, physiological chemistry, general pathology, bacteriology and materia medica and pharmacology.

PART II. Part II may be taken by candidates who have passed Part I and in addition have completed the regular four-year course in a Class A medical school.

Part II is a written examination in the four clinical subjects:

1. Medicine, including pediatrics, neuropsychiatry and therapeutics.
2. Surgery including applied anatomy, surgical pathology and surgical specialties.
3. Obstetrics and gynecology.
4. Public health, including hygiene and medical jurisprudence.

Both of these parts are set by the members of the National Board itself. The papers are carefully considered by the Examination Committee of the Board, printed and distributed to the examination centers, the latter being Class A schools where there are five or more candidates. The examinations are held simultaneously throughout the country, the papers returned to the central office and distributed there to the various members of the Board responsible for each set of questions.

PART III. Part III may be taken by candidates who have passed Parts I and II, and in addition have completed a year's internship in a hospital or laboratory approved by the A. M. A.

Part III is a practical and clinical examination in four clinical branches of medicine:

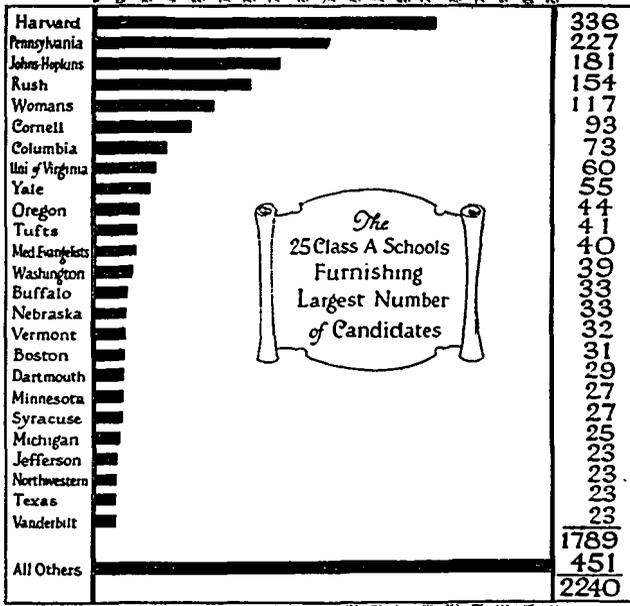
Clinical medicine and surgery, including the application thereof of the subjects of Part I; obstetrics and gynecology; public health.

This final part is a practical and clinical examination in four clinical branches of Part II with the clinical application of the

Medical Schools

From which National Board's
Candidates Come

2240 Applications received Feb. 1, 1922 to May 1, 1925

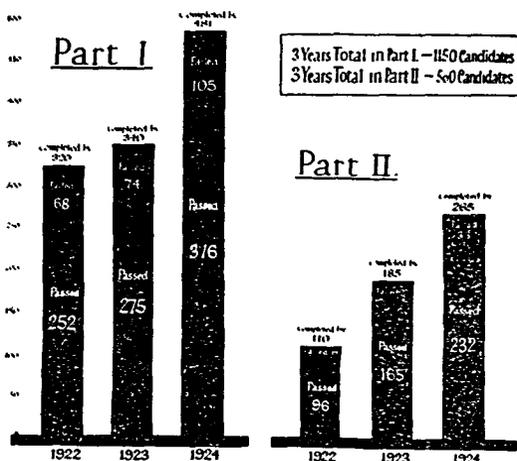


Candidates from Foreign Colleges:

Beirut.....	1	Kiel.....	1	Odessa.....	2
Brussels.....	1	London.....	1	Oxford.....	1
Cambridge.....	1	M ^c Gill.....	12	Petrograd.....	1
Dalhousie.....	1	Manitoba.....	2	Prague.....	1
Edinburgh.....	3	Melbourne.....	1	Toronto.....	11
Hungary.....	4	Moscow.....	1	Vienna.....	4
Kazan.....	2	Naples.....	1		
				Total Foreign Candidates	52

Examinations Held in Parts I and II.

Results of First 3 Years



Examinations in Part III.

1922		
City	Month	Number of Candidates
Boston	Jan.	6
Philadelphia	July	14
New York	Nov.	3
Chicago	Dec.	5
	<i>Total</i>	<u>28</u>

1923		
City	Month	Number of Candidates
San Francisco	July	7
Philadelphia	July	26
Baltimore	Sept.	12
Chicago	Sept.	7
Cleveland	Oct.	5
New York	Oct.	14
Boston	Oct.	5
	<i>Total</i>	<u>76</u>

1924		
City	Month	Number of Candidates
Boston	Apr. & Oct.	33
St. Louis	June	6
Chicago	June	14
New York	June	16
Philadelphia	June	31
San Francisco	July	7
Baltimore	Oct.	13
Chicago	Dec.	6
	<i>Total</i>	<u>126</u>

1925		
City	Month	Number of Candidates
New York	Jan. & July	49
Boston	April	14
Portland	June	5
Galveston	July	4
Cleveland	July	17
San Francisco	July	11
Chicago	July	22
Philadelphia	July	39
Minneapolis	July	8
Baltimore	Oct.	16
	<i>Total</i>	<u>185</u>

Over 85% of Candidates passed in Part III

subjects of Part I thereto. As this final part of the examination is entirely clinical or laboratory it is held at varynig times in the subsidiary centers of the Board. In these centers boards are regularly appointed for this purpose and the National Board owes a debt to many of the leaders of the profession for the self sacrificing interest they have taken in it. It would take too much time and space here to name these Subsidiary Boards which have been established at the following centers: Baltimore, Boston, Chicago, Cleveland, Denver, Galveston, Iowa City, Minneapolis, Nashville, New Orleans, New York, Philadelphia, Portland, San Francisco, St. Louis and Washington, D. C.

The candidates for the Board's certificate have come from all of the 70 Class A medical schools of this country, and from the following foreign schools: Beirut, Brussels, Cambridge, Dalhousie, Edinburgh, Hungary, Kazan, Kiel, London, McGill, Manitoba, Melbourne, Moscow, Naples, Odessa, Oxford, Petrograd, Prague, Toronto and Vienna.

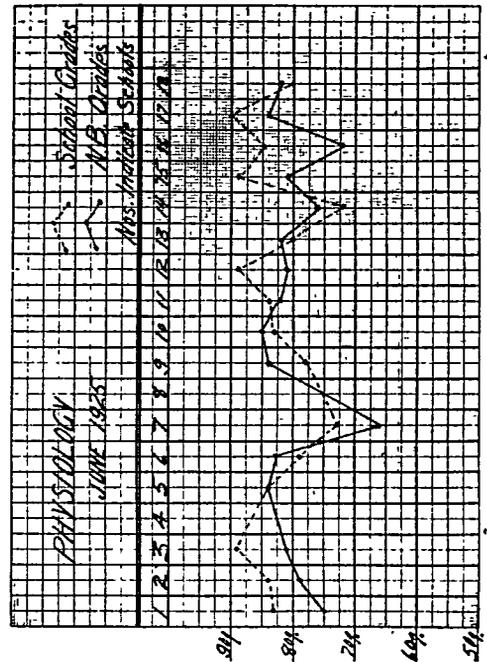
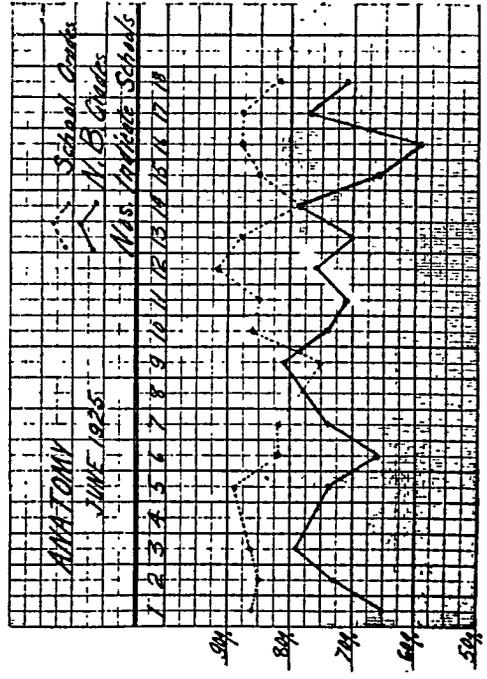
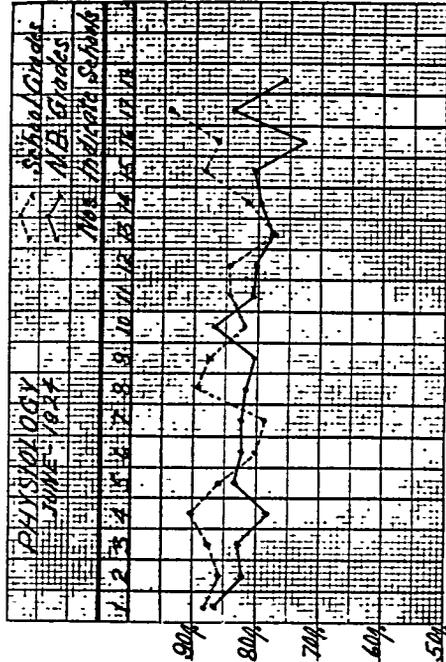
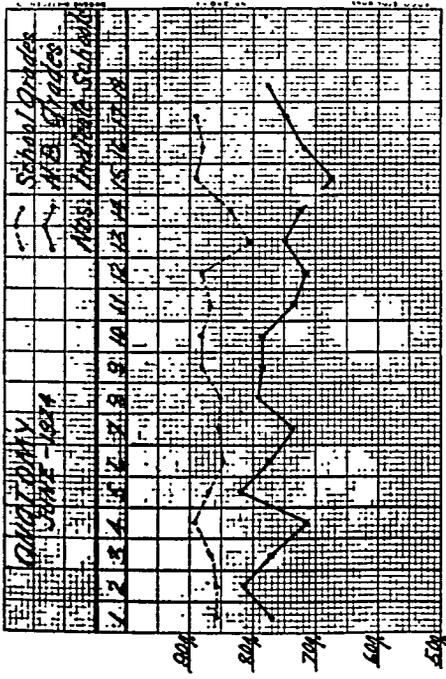
The following ten medical schools have provided the largest numbers, as follows: Harvard, 372; Pennsylvania, 250; Johns Hopkins, 205; Rush, 175; Woman's, 121; Cornell, 108; Columbia, 89; University of Virginia, 69; Yale, 64; Oregon, 49.

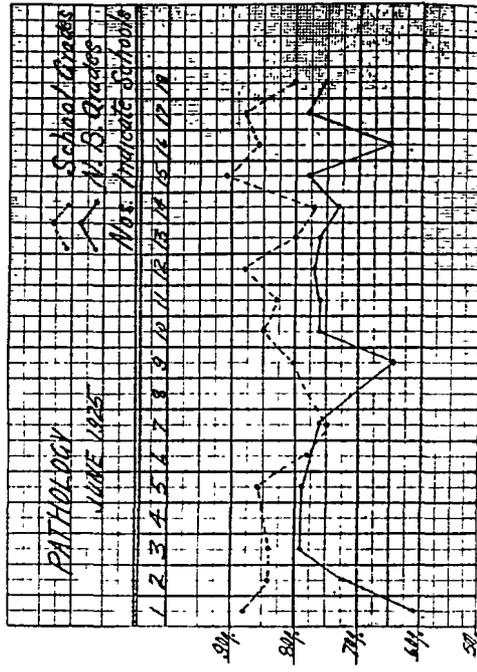
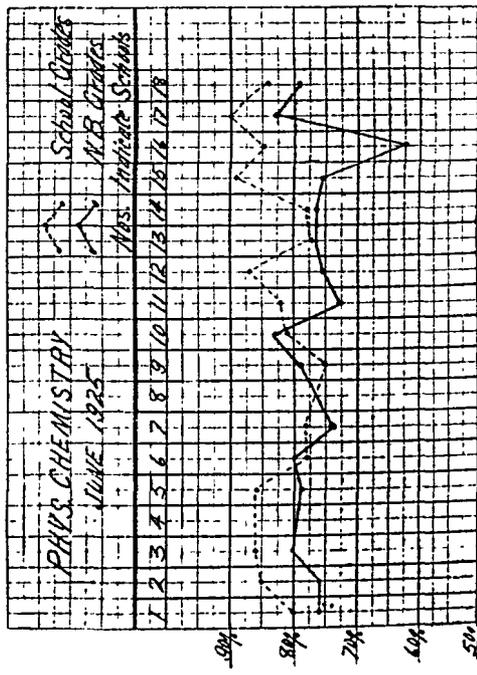
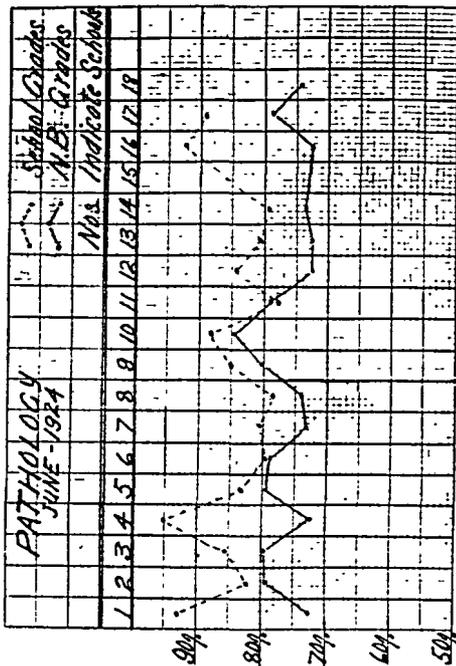
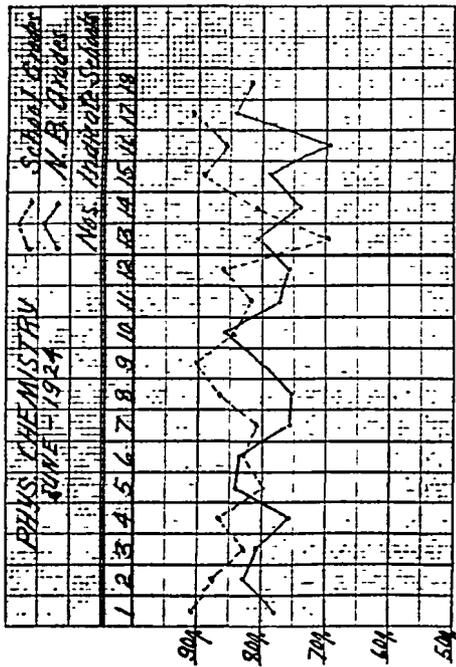
In all, 2,578 candidates have registered on the present plan, 1,773 examined in Part I, 900 in Part II, and 415 in Part III.

The Board has been much interested in the comparison of the grades given in the medical schools with those given in these examinations. A comparison of this sort has definite limitations because of the varying methods of gradiing adopted by the various medical schools. It has, however, some value in that these findings of the medical schools are measured against a common standard and so while the grading of the National Board may be unduly severe in any given subject or unduly lax in another, it at least is done for all candidates, irrespective of the schools in which they are trained, by the same examiner.

These comparisons, therefore, are necessarily made of the subjects covered in Parts I and II and show in general a somewhat lower trend for the grades given by the National Board than those given in the medical schools. In this comparative grading eighteen medical schools are taken.

The graphic lines in anatomy show the widest divergence and



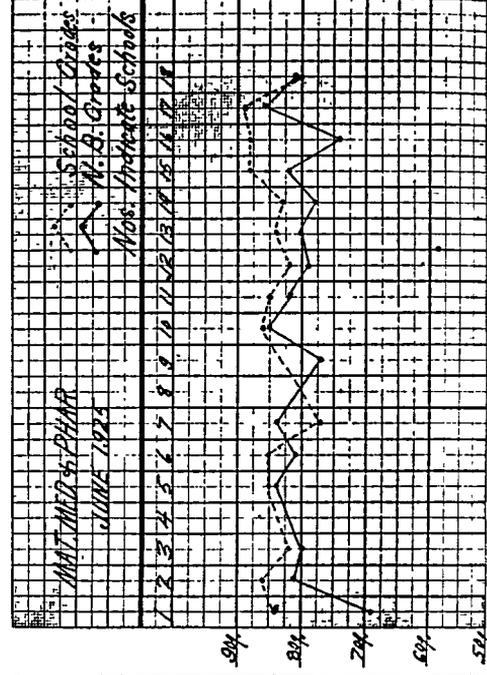
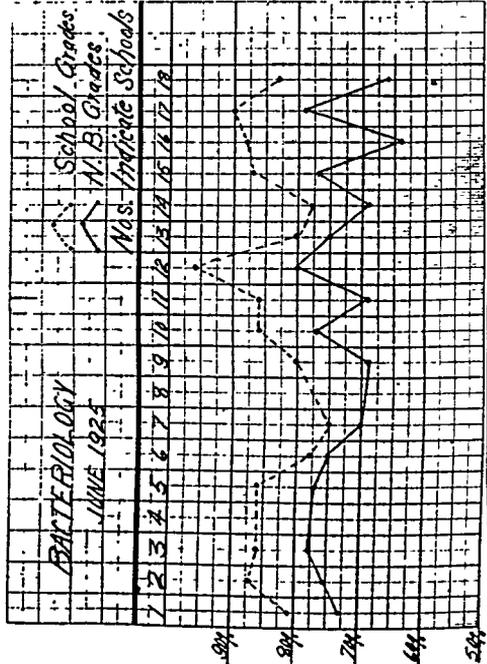
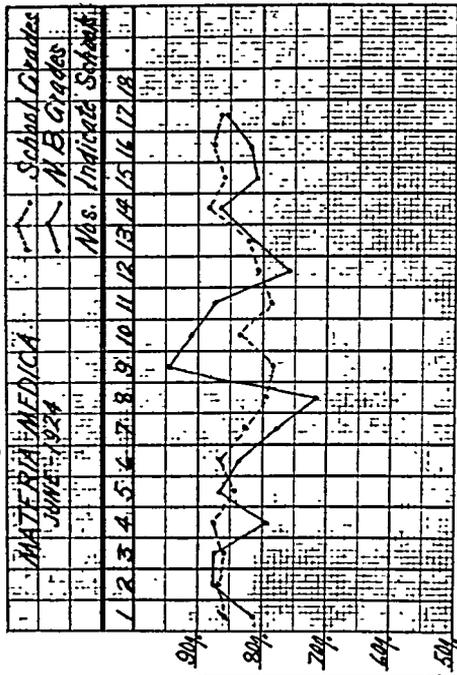
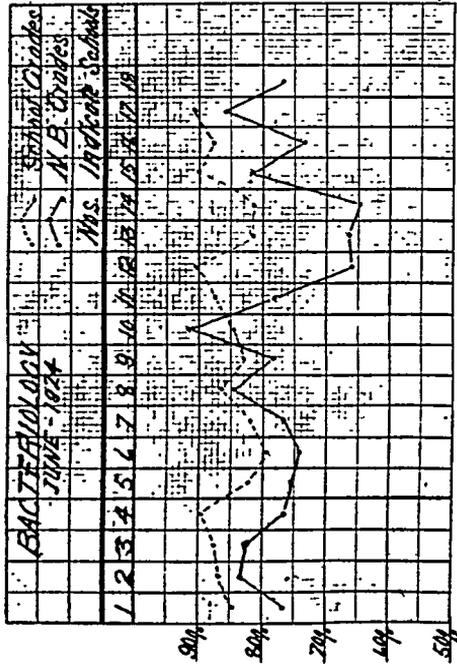


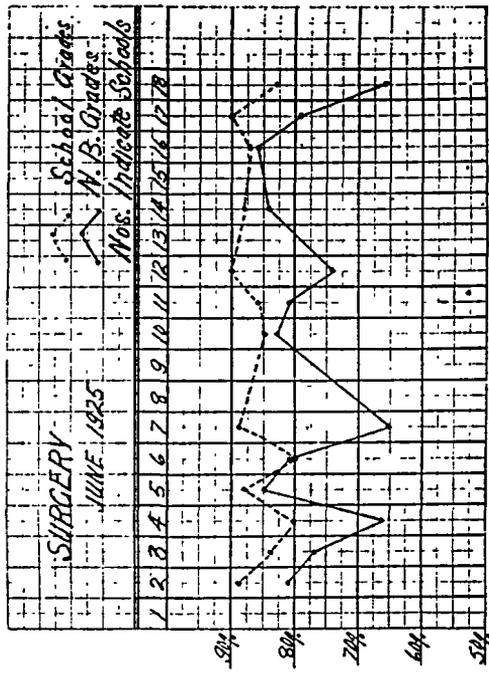
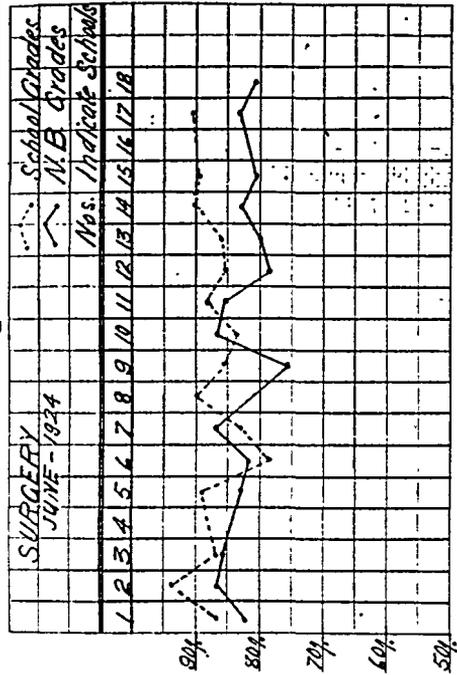
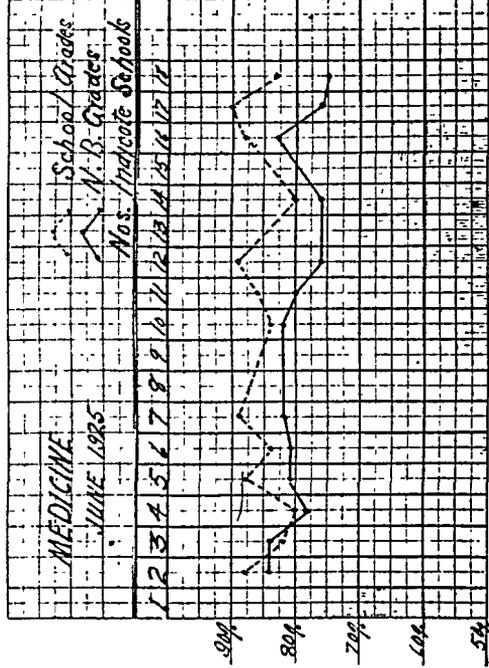
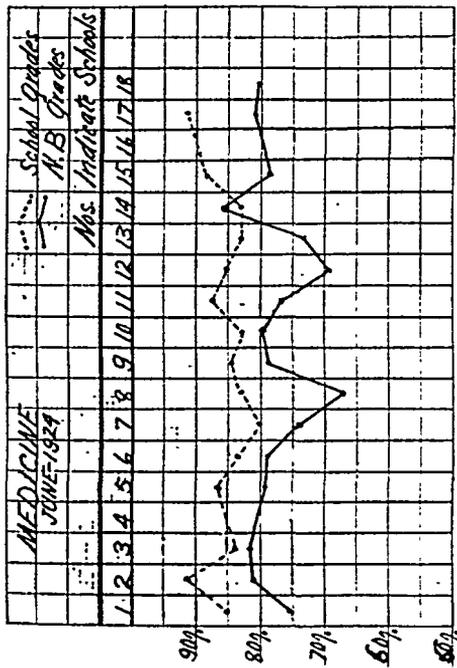
this may be taken to mean that either the examination of the National Board in this subject, or the grading of it has been too severe. In the other subjects of Part I the graphic lines run nearer together, in fact it has been interesting to see how nearly the grades of the medical schools and the National Board compare. The candidates from a certain school may not do as well in one of these examinations as they must have done in the medical schools, as for example, in chemistry in both the June, 1924, and June, 1925, examinations, but since in this subject the lines run so nearly together in the seventeen other schools, it is not taken to mean that the examination or the grading was too severe on the part of the National Board.

Another interesting result of the study shows that candidates from the same school have, for the most part, struck nearly the same level in the National Board examinations for both of the years 1924 and 1925. In comparing these grades for Part II the same general trend is seen for the National Board grades to be somewhat lower in the majority of cases than those given in the medical schools. In none of the subjects of this part is the difference so marked as in anatomy, in Part I. In public health these lines are a little further apart perhaps than in other subjects, a result to be looked for in the light of the comment of the examiner on public health quoted later in this paper. Needless to say, these grades were given to the candidates by number, nothing being known of the candidates but this, by the examiner who did the marking.

This summary is given in order to show the basis of the impressions which follow.

You have freely discussed in this body during the past four years a correlation of the fundamental and clinical branches. The National Board has thoroughly believed in this principle and it is unnecessary to further discuss it here. We believe that the strongest impressions of all growing out of these examinations, is the great importance of such correlation and that the candidates who are best prepared have been trained in the schools in which such correlation has assumed the greatest importance. The medical school supplying the largest number of applications has also stood first in the results of these examinations. The reason for this lies no doubt partly in the fact that a general examination





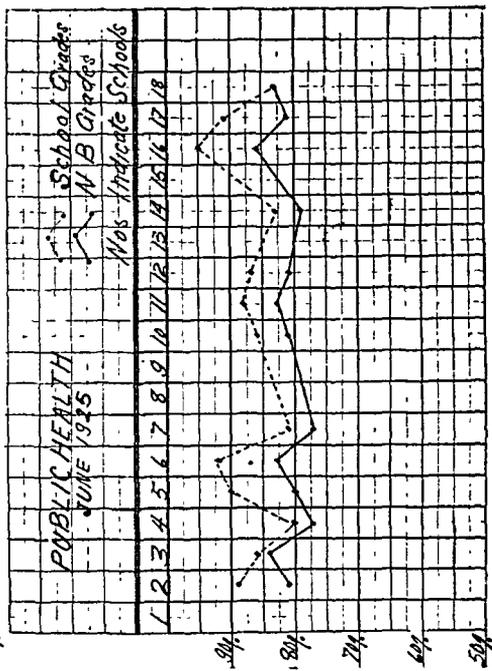
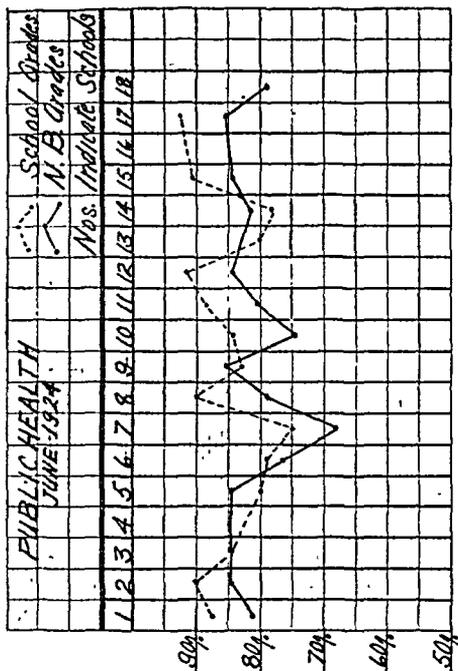
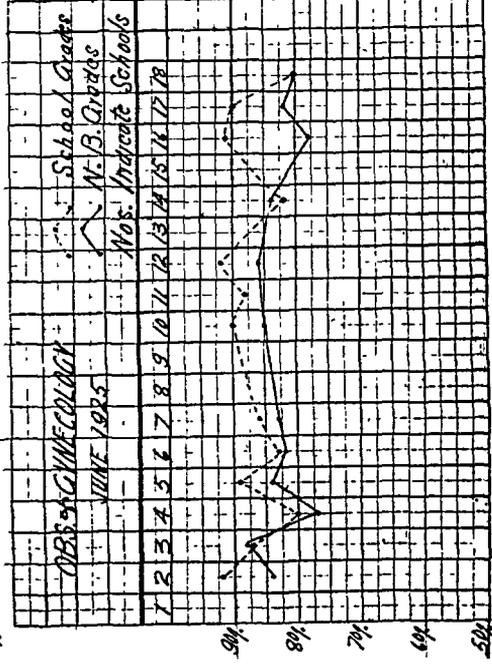
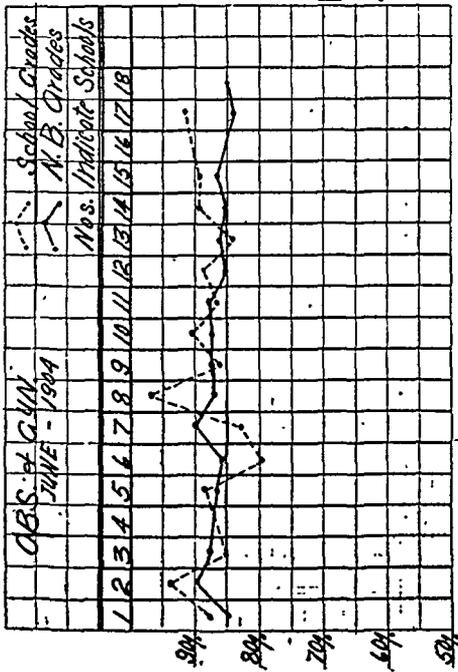
covering the entire field of medicine is given here at the end of the medical course as a prerequisite for the degree. I refer to Harvard Medical School. The Board has constantly kept in mind the fact that its purpose is to determine the candidate's qualification to practice medicine but we believe this all impelling reason for a medical course is sometimes lost sight of in teaching it. Particularly does this apply to the examination in Part III, but we go even further and believe that the basic examination in Parts I and II should have that trend.

It has been very interesting to see the different emphasis placed on the same subjects in the various medical schools. In order to meet this the Board has attempted to so set its examinations in each of these subjects that will meet this varying emphasis.

As a result of these experiences, then, the Board feels that in anatomy its candidates, as a whole, have shown more knowledge of "dead house" anatomy, involving a memory test, than in the application of this knowledge to living function. We believe that the study of anatomy can be made, and is made in a few schools, a vital living thing because it is taught with a direct functional bearing. We believe that our candidates would have been better prepared for this type of an examination, particularly in Part III, if they had been given more regional anatomy than most of them have had, and especially if this regional anatomy had been taught by one fully alive to its functional importance.

In physiology and in physiological chemistry the Board believes that too great a distance, both mentally and physically, separates these subjects from the clinics. We realize that at present it is very difficult to find either physiologists or chemists sufficiently interested in the clinical application of these subjects to conduct an examination which will bring out this application in the medical clinic or wards which the Board believes is the proper place to hold such an examination. At present these subjects are examined in the laboratory as a part of the general examination in medicine in Part III because so far it has not proven practical to adopt the clinical method which we believe is the ideal.

In pathology and bacteriology it seems that the training of the Board's candidates has been more uniform and has been more "clinicalized" than in the former subjects. The impressions grow-



ing out of the examinations in these two subjects are that the modern methods of teaching these subjects are satisfactory from the Board's point of view. In the case of bacteriology there is considerable variance in arranging the scheduled instruction in the various medical schools. For the most part the basic principles of bacteriology are taught in the second year and such special subjects as immunology and parasitology in the third. The Board attempts to lay stress on these basic principles in the examination in bacteriology in Part I but questions on immunology and parasitology are at times included, and so the Board has provided for "incomplete" examinations in this part. By this is meant that if the instruction in any of the subjects of Part I is not completed in the particular medical school by the end of the second year, the candidate may postpone, at the most, two of these subjects for further examination at the end of the third year. This latitude makes it possible, therefore, for all of the candidates to come to the examination with their completed course of instruction behind them.

In materia medica and pharmacology I refer you to a paper read before this body in 1924 by Dr. Walter L. Bierring, the examiner in this subject on the National Board. Dr. Bierring has pointed out in this paper, and as the Board believes with him, the proper time to teach this subject is not until students have finished the subjects of anatomy, physiology and chemistry which is done in the first two years, thus placing pharmacology properly in the third year. Many of the Board's candidates take advantage of "incomplete" examinations here, omitting this subject for examination until they have finished the third year.

This subject offers an excellent chance for combining the laboratory subject of pharmacology with its clinical application, therapeutics. The time honored term of materia medica is retained by the National Board in order to meet the legal requirement of certain state boards rather than because it now has any special importance as far as medical training is concerned.

The percentage of failures in Part I has been a little over 20 per cent.

The Board's candidates have fared much better in the clinical subjects of Part II than in the fundamentals of Part I. This result is to be expected, of course, since the subjects of medicine,

surgery, obstetrics and gynecology and public health are under less controversy in medical education and therefore the instruction perhaps, more uniform. Again most students expect to actually practice medicine and these subjects in their clinical dealing with the patients make to them the greatest appeal. The percentage of failures in Part II has been a little over 11 per cent, only slightly more than half of that in Part I.

As these same subjects are examined on in the clinical and laboratory examinations of Part III, impressions growing out of the results apply to both of these parts.

In medicine the candidates have shown more proficiency in facts concerning disease in general than in the demonstration of the application of this knowledge on the patient. Medical schools vary in clinical resources and naturally the Board finds that candidates coming from schools in the larger centers have had more clinical training and are, therefore, more proficient as a rule in showing it. This applies with equal force to surgery, and obstetrics and gynecology. In surgery the Board believes that, as a rule, too much attention is paid to regional surgery and too little to surgical principles. In this examination, no attention, or at least very little, is paid to technique since the Board believes, as of course you do, that this is more a matter for graduate than for undergraduate study.

The Board hopes that its candidates will show in the future, more understanding of such fundamental things as wound healing, inflammation, fractures and dislocations, and less about brain tumors and thyroid surgery.

Insofar as the surgical specialties of eye, ear, nose and throat are concerned the Board feels, as it does about other specialties, that too much time is given to these subjects in the undergraduate years. These examinations are limited to the knowledge of such subjects as might be reasonably expected of a modern practitioner of medicine and are largely concerned with the diagnosis and treatment of the simpler conditions affecting the eye, ear, nose and throat. If one wishes to specialize in these subjects he will, of course, fit himself to do so by thorough graduate study.

In obstetrics and gynecology, a combination of subjects seeming logical from the first the Board has found the theoretical training as shown in Part II to be uniformly good. The same

advantage of clinical training here as in the two former subjects is shown by candidates from the larger centers.

One of the interesting developments of recent years in medical education has been the decided improvement in instruction to undergraduates in public health. This subject has always loomed large in importance to this Board, the examiners having been from the start the surgeon general and one other from the U. S. Public Health Service. The comment of one of these examiners will bear repeating. In answer to a letter inviting his comment on this question he states that "I suppose it is a little hazardous to generalize but I have the feeling that there has been very material improvement in the public health papers during four or five years in which I have been preparing the questions and grading the answers. When I began this work it was somewhat difficult for me to frame questions that would not grade the great majority too low. I have no difficulty in this respect now; indeed the majority of the men do very well in the examinations."

He then expresses the hope that the examinations of the National Board in this subject, have had something to do with this improvement, although he states that "the public health movement in an educational way has been flowing in full tide for several years."

I am fully in accord with the statement just expressed,—that it is hazardous to generalize—I have been asked, however, to give you these impressions and have done so realizing that you expect nothing further, and trusting that you will condone generalizations. If I have accentuated the clinical, it is because the Board's purpose has been to determine the fitness to practice medicine. Taken as a whole the National Board has found medical education in this country sound and capable of producing a very high type of practitioner of medicine. It is, of course, the prime object of this body to improve this educational training and the National Board hopes that it may be of service to you in doing so.

As has been stated in the beginning, your continued interest is eagerly sought and your suggestions most welcome. The National Board fully realizes that these examinations may be improved in many ways.

DISCUSSION

DR. WILBURT C. DAVIDSON, Baltimore: The members of this Association can do a great deal towards increasing the success of the National Board of Examiners by encouraging medical students to take their examinations.

THE TEACHING OF SURGERY

C. A. HAMANN

Western Reserve University School of Medicine

To say something new, or to bring out anything novel in the way of methods of teaching surgery, or for that matter, any of the medical subjects is almost an impossibility. When therefore the writer was asked to contribute a paper along these lines, he hesitated, knowing that the most of his statements would probably be for the most part but a re-iteration of previously uttered views and a compilation of platitudes that would bore this audience. However, it may be that reference to some of these matters may evoke useful discussion. Only a limited number of the aspects of this subject can be considered and it will probably be best to take them up under separate heads.

It is assumed that the purpose of the teaching of surgery in a medical school is to prepare students for the practice of medicine—to train doctors in other words.

THE HEAD OF THE DEPARTMENT.—The professor of surgery, who is the head of the department, and has been chosen as such, presumedly for his scientific attainments, zeal and ability for teaching and investigation (not to mention numerous other desirable qualifications) should, in my opinion, be a man of the university type—who has the proper spirit and aim and who is not burdened with an extensive private practice.

It is not my purpose to discuss the question as to whether he should be "full-time" or not. His major interest should be teaching and investigation. It is impossible for a busy practitioner to give the proper amount of time and energy to be head of the department of surgery—to teach, investigate and stimulate others to investigate—to carry on the large amount of administrative work and to keep up to date in surgical progress. He should have entire charge of the planning of the course in surgery—and the assignment of the duties of his association. In other words, there should be "central-planning."

TIME AT WHICH THE TEACHING OF SURGERY SHOULD BEGIN.
 —The latter part of the second year would seem to be the proper time to begin the teaching of surgery; by this time students have had most of their anatomy, physiology and pathology; before this it seems to me that they would hardly profit much by attempts to

UTILIZATION OF THE PRECLINICAL BRANCHES.—The knowledge which has been gained previously by the student should be utilized by the teacher of surgery and woven into the fabric of surgical teaching. A course in applied anatomy offers a very good opportunity for giving third year students an insight into the relation between anatomy and surgery, not merely the operative side, but, far more important, the pathological and diagnostic sides of the subject.

When taught by a man of large experience in surgery, with a thorough knowledge of anatomy and embryology, a course in applied anatomy gives the best underlying basis for a thorough knowledge of surgery and for training students in the proper way.

It is, of course, to be assumed that the students have had their instruction in descriptive anatomy and their dissection as well as their pathology and physiology before this course is given. The anatomy of the living should be taught.

The aim should be to get the student to think in terms of anatomy, physiology, pathology and chemistry in the study of his clinical problems.

“The knowledge that one can use is the only useful knowledge;” so it is, to a large extent at any rate as far as the relation of the preclinical to the clinical subjects is concerned in the solving of diagnostic and therapeutic problems.

DIDACTIC LECTURES.—The present tendency is largely, if not entirely, to do away with these; this in my opinion is not correct. Principles can be instilled in such lectures, systematic instruction can be given, and a better, more interesting presentation of the subjects made than by reading textbooks alone—provided however that the proper teacher lectures. I would not have the entire field of surgery covered in this way—that would be impossible; probably one or two lectures a week would be an appropriate number. In these lectures an opportunity is afforded for illustrating by drawings, charts, lantern slides, etc., and museum specimens. In this connection I should like to say that in my

opinion, good museums of anatomy and pathology constitute a feature of value in teaching; many students have facts impressed upon them far better by seeing things, rather than by hearing about them; unfortunately museums and the opportunities they offer are apt to be neglected.

QUIZZES AND DEMONSTRATIONS.—Quizzes are rather out of fashion at the present time; it is my belief however that, when properly conducted, they afford a legitimate and valuable method of instilling and impressing knowledge. No matter how much mere memorizing may be decried, the fact remains that a great deal of memorizing is necessary and quizzes, conferences, and demonstrations are important aids in the process. A good quiz-master may serve as an “accoucheur of ideas.” Informal discussions between instructor and students are of benefit.

Preparation of brief papers and abstracts of the literature by students, no assigned topics, afford an opportunity for instruction of classmates (teachers as well) and for introducing men into the use of the medical library, and making them dig out knowledge themselves. The danger of “spoon feeding” should be considered in all these procedures. We should endeavor to “train the intelligence not only the memory.”

DISPENSARY TEACHING.—Usually this is carried on in the third year. Here the student has an opportunity of seeing the more common and so-called “minor” cases. Instruction in the application of dressings and in bandaging can be given and minor operative procedures practised by the student. The dispensary teacher, it seems to me should be a man of experience and wide knowledge; there is too great a tendency to relegate dispensary teaching to young and inexperienced practitioners.

That the dispensary offers a place for seeing and recognizing the earlier stages of diseases should be borne in mind.

TEACHING OF THE SUBJECT OF FRACTURES.—This is apt to be inadequate, and should if possible be conducted by some one especially interested in the subject.

OPERATIVE CLINICS BEFORE LARGE CLASSES.—These are almost useless and have been largely given up as a waste of time. Diagnostic Clinics however are of great value and here the entire class can participate.

OPERATIVE SURGERY ON THE CADAVER.—This is of little

value, except for the teaching of a few typical operations. Operative surgery on animals is of much greater use and affords an opportunity for teaching and practising many things, such as technique, methods of asepsis, handling of hemorrhage, anaesthesia, and of observing wound healing and complications.

CLINICAL CLERKSHIPS.—These afford the best opportunity for bringing students into intimate contact with patients and for following the course of disease; their more general introduction constitutes one of the greatest advances in teaching. Students, however, should receive proper supervision; one can not turn the average student loose in the ward and expect that he will get much out of it, unless he is guided to a certain extent in history taking, examination of patients, etc.; furthermore, unless there is laid out for him a more or less definite plan there is apt to be wasted time. In the wards the student is given an opportunity to learn by doing; he executes various diagnostic and therapeutic procedures, gets an introduction into the art of surgery, and sees operations and assists at them.

There is a tendency to neglect the thorough clinical examinations of patients and to rely too much on laboratory information and upon roentgenograms; there is danger that diagnostic skill and acumen will be lost if too much reliance is placed on laboratory procedures. The laboratory should be the servant, not the master of the clinician in the art of medicine and surgery.

In the preclinical years, it is not only the knowledge of facts that the student should acquire, but, and probably more important than these, the learning of *methods*, and of *accuracy*—and absolute honesty that should be instilled into him. These methods and the accuracy and the honesty should be carried on in his clinical years and of course in his subsequent practice.

The greater part of the student's time in the fourth year should be spent in the hospitals, in the study of general medicine and surgery.

He should be trained broadly—the specialties should receive a minimum of attention—much of the instruction in these can be given by the departments of medicine and surgery—in the courses on these subjects. It should be the aim to instill into the student the idea that there is no separate surgical diagnosis—as distinguished from medical diagnosis. There is only one diagnosis.

Surgical specialties should be relegated to the third year; the proper time for the cultivation of these is after graduation and after the hospital year.

It is in the clinic only that the *ethical* side of the doctor's activity can be impressed upon the student.

The patient is not merely "material"—he is a human being, with a disease—plus all his other mental, social and environmental troubles, and possibilities and problems for the future—in need of help.

The process of making a real surgeon must of course continue long after graduation, and is to be conducted in hospitals, where the young graduate serves first as interne, preferably in a rotating service, then as surgical resident for a period of two to five years—as an assistant on an active service—serving in other words as an apprentice to a master or masters. More and more men are now taking such a prolonged period of training. Permit me here to allude to the efforts of the American College of Surgeons. This association has accomplished and is accomplishing a great deal in the improvement of surgery and of hospitals throughout the country and its praiseworthy efforts should receive our support.

Should the undergraduate medical school give so-called post-graduate instruction? There is, of course, something to be said on both sides of this question. I am inclined to think that, on the whole, it is better not to attempt it on a large scale. The time of the instructors, financial resources and the importance of the improvement of undergraduate instruction and of investigation seems to me to point to the unadvisability of offering it—unless a separate corps of teachers can be provided.

After all, the student can only be exposed to learning and given opportunities in the medical school. He must get it by his own efforts. But an inspiring and enthusiastic teacher can help him a great deal, by the instillation of sound principles, giving him a broad, sound view, arousing his interest, teaching him methods of work and imbuing him with a high sense of the difficulties, responsibilities and value of his profession.

There is danger in the too great standardization of the curriculum. Opportunities for individualization and for electives, should be provided. After all, it is the teacher, not the curriculum, that is the more important.

DISCUSSION

DR WILLIAM DARRACH, New York: I see very little to criticize in Dr. Hamann's paper and especially do I approve the emphasis which he laid on the teaching of surgery to the undergraduate being largely confined to that part of surgery which is used by the general practitioner, leaving the technical side for post graduate work. I think that too many of us are led into giving to the undergraduate students many of the finer details which we are especially interested in and which belong to surgery as a specialty rather than as a part of the general medical diagnostic or therapeutic problem.

I wish it were possible to develop more the teaching of fractures and dislocations. It has been very difficult at our school. There has been a constant warfare between two individuals, the man who is responsible for keeping the curriculum more or less in order, that is the dean of the Medical School, and the man who is in charge of the teachings of fractures. The two individuals have had rather a constant warfare all the time. They happen to be the same person in our school, hence that problem with us at least, has not been worked out satisfactorily because the Dean will not let the man interested in fractures devote as much time to it as he would like to.

It seems to be a problem, as Dr. Hamann stated, that the medical schools are not generally interested in any more than the general practitioners or the surgeons, and yet, it is a subject which is fraught with a great deal of difficulty both from the patient's standpoint and the legal standpoint. We have tried to concentrate on the general principles underlying this subject, allowing the students to gather their own application of those principles in their practical work. In the latter part of the second year they get in the laboratory the theoretical side, that is, the process of repair, and early in the third year they get some concentrated work on the principles underlying the repair and handling of fractures based on the pathology. During the rest of the third year, they are allowed to apply those principles under guidance in the outpatient department, and in the fourth year in the wards. That plan has worked out more satisfactorily than trying to spread the theoretical instruction throughout the whole year.

DR OSKAR KLOTZ, Toronto, Canada: Dr. Hamann brought up the need for the close cooperation in the teaching of pathology with surgery. He has indicated that the importance of the two subjects is so interlocked that one cannot separate them.

From the standpoint of the teaching of pathology, that brings up the point that we have often had misunderstandings on how far pathology can take up the work of special departments. Like all the departments, the time allowed in the curriculum is quite limited and it is quite impossible for the Department of Pathology to attempt to teach the phases that apply to the special branches. The path-

ologist can only take up in a large way the general subject and must leave the teaching of the advanced work in the hands of a special department.

Thus, I think, we will get a closer union of the departments by having them teach pathology in the specialties, with, however, the coordination of the teaching groups within these departments.

Regarding the use of the museum. That is a subject on which I feel very keenly. We all know the history of the museums of our schools. Twelve or fifteen years ago there was great enthusiasm regarding the development of the museums, in every one of our medical schools. Since that time not a few have lapsed so that their value in our teaching problem is much less. This is partly the result of the geographical position of the museum, frequently, in relation to the clinical department. A pathological museum has become one of the accessories of the pathological department. This need not be, and I believe the museum can be used to much greater extent now than in the past. Instead of using specimens for the purpose of lectures, for you cannot use specimens to teach large groups of students—it is necessary to use them only in teaching small groups—if the clinical department will make use of the museum it will be much better. The clinical department can use it with the smaller group, teaching it in the ward—not bringing the museum into the ward, but having the museum have such preparation within itself that the clinician can go at any moment and find his specimens there.

In teaching in the ward, 'phone to the pathological department and they will set aside the specimens illustrative of what you are teaching, then bring the students over for a few moments and explain to them the pathological conditions present in the patient.

I think that this method is of far greater value than the lecture method or the so-called "museum teaching" in which incoordinate teaching of museum specimens is carried out inside the museum without any relation to the patient.

DR C. A. HAMANN, Cleveland: In a course on applied anatomy, obviously the application of anatomy to internal medicine and the specialties can be considered, and it has been our custom to do this as far as we are able.

THE TEACHING OF BIOCHEMISTRY

CHESTER J. FARMER

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A little over five years ago a report on the teaching of biochemistry was presented before this Association by a subcommittee.⁽¹⁾ Its suggestions were inspiring. Although probably never intended as a stereotyped form for the presentation of this subject to the student, it cannot but have helped greatly in the general betterment of the teaching of biochemistry throughout the country. Great as have been the developments in this field since that time, yet in no way is it necessary to alter the general plan as outlined there. The few suggestions which I have to offer today, have come as a result of personal experience in the teaching of biochemistry to medical students, following a plan in many respects similar to the one referred to above.

Most students make their acquaintance with chemistry in the high school, a few omitting this subject until they have entered college. Until recently, the preparation in the secondary school, owing to differences in quality of instruction, equipment and curriculum, presented a very variable raw product to the college. The situation is now more hopeful, for thanks to the Committee of Chemical Education of the American Chemical Society, a "Standard Minimum High School Course in Chemistry" ⁽²⁾ has been proposed. This if generally adopted will adequately prepare the student for the chemistry of the premedical years.

The requirement of eight semester hours of general chemistry and four semester hours of organic, as indicated by this Association as a premedical minimum, I believe is correctly interpreted by the student. At Northwestern where our admission is on this basis, a survey of credits presented by the entering class of this year shows an average of 21.2 semester hours of chemistry. Out

(1) Folin, Shaffer and Mathews; *Proc Assoc. Am. Med. Col.*, March, 1920, p. 107.

(2) Report-Correlation of High School and College Chemistry. *Jour. Chem. Educ.*, 1924, i, No. 5.

of a class of 107 men, only 26 entered with the minimum requirements, while 38 showed a broader general training as evidenced by an academic degree. This condition must be fairly typical of that prevailing in most medical schools. The men realize the advantages to be gained by a more adequate preparation, and are securing it.

The prominent part which physical chemistry has come to play in the interpretation of vital phenomena, makes it essential that at least the elements of this subject be presented early in the course in biological chemistry. The fundamental gas laws, the diffusion of gases, of liquids, osmotic pressure, vapor tension, and electrolytic dissociation, must be reviewed and extended before the student is in a position to understand such a simple matter as the difference between reaction of a solution and its titratable acidity or alkalinity. The question of indicators cannot be adequately discussed until the student understands the significance of hydrogen-ion concentration. All of these subjects can easily be given by the instructor in biochemistry in a few periods of correlated lecture and laboratory work, providing the student is equipped to handle it. This requirement is not fulfilled by adding to the premedical curriculum a 4-hour course in physical chemistry for most of the fundamental laws have been presented in general chemistry. He is in need of a course which will enable him to analyze critically the experimental data presented. He is in need not only of a tool, but also of a mental viewpoint. Such is furnished by a working knowledge of simple mathematics. If the student has the ability to work problems in percentage, in ratio and proportion, and can use logarithms, his work in analytical chemistry, and the physical chemistry mentioned above, need offer no obstacle.

In a subject as comprehensive as biological chemistry, differences in the material presented by different instructors is bound to occur. All courses should endeavor however to conform in a general way, relative to fundamental material. Individual variation is essential to the life of the science. The object to be attained is to enable the student to intelligently follow the progress of the science as applied to medicine and to furnish him with a tool for the trial of his own ideas. It is therefore not the quantity of

material presented that is of importance, but rather, that which is wisely selected and efficiently taught.

The division of the course into lectures, laboratory work, written and oral quizzes, also some reference work as in the preparation of a paper or thesis on a selected topic, is generally acceptable. The grading of such a course probably varies considerably. At Northwestern the final mark is a composite, made up of 30 per cent for the final written examination, 30 per cent for laboratory work, (one-third of this mark depends upon technic) 30 per cent for written and oral quiz work, and 10 per cent for the thesis. By this system of grading, the student of average ability finds that if his daily exercises are conscientiously performed, the final examination holds very little of terror.

The usual ratio of 1 hour of didactic work to 2½ hours of laboratory exercise is so far as I know quite generally adopted. The use to which the lecture hour is put, or the abuse which may be made of it, is an excellent indication of the value of the course as a whole. Clarke (1) states the lecture to be of value "in leading students safely through a new and difficult process of thought." How far should the lecturer go without over-stepping his mark? This is answered by Flexner (2), in the following—"Good teaching, is, of course, priceless; but good teachers accomplish most, not by painfully consuming their time and energy in over-elaboration that does everything for the student, but rather by the vigor, originality, and freshness with which the day's theme is expounded without being exhausted." The student therefore receives from the lecture not only the desired information, but stimulus to answer for himself the many questions suggested by the discourse. Such a course can follow no single text, but finds its limit only in the literature available and the ability of the instructor.

The laboratory course should be arranged to support the lectures whenever possible. The course should employ precise quantitative methods, with a minimum of qualitative description. Frequently a qualitative experiment loses its significance almost completely, and often involves much cumbersome detail which

(1) Clarke, *Jour. A.M.A.*, 1923, 1xxx, 1195.

(2) Flexner, *Medical Education*, New York, 1925.

could be eliminated by a simple quantitative investigation of the use of indicators. Unfortunately, in college the student is frequently given an arbitrary rule for the selection of an indicator. In the medical school, where indicators are frequently used to signify the hydrogen-ion concentration of a solution, the student finds his previous inflexible notions developed through a study of titration sadly in need of readjustment. How can the matter be easily and quickly simplified? From our experience, the best way is to have the student prepare a set of reference tubes of known pH value, following either the system of Sørensen (¹), or that of Clarke and Lub (²). Into these tubes the indicators in question are placed, and the colors noted. These may be directly referred to the titrations under question, which for point of illustration may be those of a strong acid with a strong base (hydrochloric acid with sodium hydroxide), a weak acid with a strong base or vice versa (example of former is usually acetic acid and sodium hydroxide), and finally the titration of phosphoric acid with sodium hydroxide (representing the replacement of one and two hydrogen atoms respectively).

Usually the theory underlying the choice of indicators will be apparent, from the above exercise. Where equipment permits, the electrometric titration of the above solutions performed individually, or in groups in charge of an instructor with a simply constructed potentiometer of the Hildebrand type (³) is of the utmost value. By plotting the curves of these titrations, the student has at once unfolded before him the explanation of acidity, neutrality, and alkalinity, as well as the relationship of hydrogen-ion concentration to point of change of indicators in titration. A student having this preparation has no difficulty in understanding such fundamental subjects as buffer systems, the regulation of body reaction or the iso-electric point of proteins. All of the above fundamental physical chemistry can be given in one 3-hour laboratory period, and is worth a dozen superfluous carbohydrate and protein tests.

Possibly a word as to the conduct of laboratory instruction

(1) Sørensen; *Biochem. Leitscher*, 1909, xxi, 131.

(2) Clarke; *The Determination of Hydrogen Ions*, Baltimore, 1920.

(3) Hildebrand; *Jour. Am. Chem. Soc.*, 1913, xxxv, 846.

may not be out of place. Here, as in the lecture, the student should be carefully guided in working out for himself the "facts and skills which the practitioner needs to master." (1). This can only be done by the judicious use of laboratory manual, textbook, and instructor's time. As an attempt in this direction, our laboratory work at Northwestern is given in what I have called the "objective" manner. The student uses the laboratory manual as a guide to procedure. The textbook forms his compend to tell him "what it is all about," and the instructor serves to guide the student in his search for information and the use of his time.

As actually carried out, a definite number of men are assigned to each instructor, the latter rotating at weekly intervals. The student knows in advance the assignment for the day and usually has made some preparation at home. When he feels that he understands the purpose of the experiment, he reports to his instructor, who inquires the objective sought, and a few details, either of procedure or principle. If found to be sufficiently well informed, the student is instructed to proceed with the laboratory work, recording data briefly but comprehensively; confirming, or modifying his conception of the objective stated. If the student is not well enough acquainted with the facts sought, the instructor refers him to text or literature as the case may require. It is true that this system places a limit upon the amount of laboratory work which can be performed, but by a judicious selection of material, we have found that the student gets a better understanding of the subject as a whole, develops better technic, and receives a stimulus to clearer thinking, as well as a degree of confidence in his own ability to work his future problems independently. The beneficial effect of this system extends beyond the student to the instructor. If young and inexperienced, he instinctively makes a better preparation for his classes, and supplements his text with the current literature. I do not mean to imply that the laboratory instructor assumes the rôle of a cold impartial judge of the student's ability to proceed with his work. On the contrary, the instructor and student frequently are found together in some quiet corner discussing the work of the course

(1) Flexner; *Medical Education*, New York, 1925.

or related material coming to the student's attention as a result of collateral reading.

This plan leaves with the student the major responsibility for his progress. Frequently at unassigned hours, he may be found repeating a portion of his work, or busy with some little problem that has suggested itself. I believe it is a dangerous practice, entirely foreign to the spirit of modern pedagogy, to so completely fill a schedule that the student is denied time for reflection. Time is needed to clarify his ideas. He is entitled to learn of his progress in the science by the trial of a few simple problems of his own.

Certain subjects do not readily find a place in the first year course in biochemistry. This is due either to a lack of time, or to their classification as physiological rather than chemical. I refer to the course in blood analysis and calorimetry. At Northwestern we are teaching these subjects together during the second year. The class is divided into fourths, each section receiving in its turn instruction one morning a week for a period of eight weeks. The underlying theory of calorimetry is presented by the instructor, while under his supervision the students measure the oxygen consumption and carbon-dioxide production of a few members of their group. They then calculate the respiratory quotient, total heat production and basal metabolic rate of their subjects. Following this, an informal seminar is held, the students presenting and discussing brief abstracts from the literature pertinent to the work. The same procedure is followed in considering blood analysis, the emphasis always being placed on normal values. This course neither needs nor carries a final examination, and is invariably a pleasure to conduct.

The training which has been afforded in prosecuting the courses outlined above is invaluable to the clinical clerk in the senior year. He sees the importance of biochemistry to his medicine, interpreting to him the physiology of the normal and pathology of the diseased. It indicates to him that the great advances to come, must be made by an application of physical and chemical technic and methods of reasoning.

Before concluding, I should like to present some data, which are a retrospect of our classes in biochemistry of the years 1920 to 1923. Although this analysis is of most interest to me, it may

possibly answer to others something as to the relative value of a more liberal preparation before entering the medical school.

This analysis is the result of an examination of the work in biological chemistry of 372 men. Table I indicates the ability of the average college graduate to successfully complete the course.

Table I, Degree Men

Total	76	
Passed	60	89.6%
Failed ⁽¹⁾	7	10.4%
Passed (by re-examination) ..	3	(42.8% of "Failed")
Total with clear record in biochemistry	63	94.0%

Every instructor meeting freshmen medical students finds by experience that men coming from certain colleges usually show evidence of thorough and careful preparation. This is so marked that he classifies these men, in his mind, as coming from "good schools."

Likewise another group presents evidence of a surprising lack of preparation, and in turn, these men are similarly classified as coming from "poor schools." This grouping is purely a personal one and applies to his subject only. It is however so uniformly true when considered from the aggregate, that the classification has merit sufficient to warrant its presentation here. Both "good" and "poor" schools are on the accredited list of colleges. In accordance with this explanation, table II presents data of men receiving their preparation at "good" schools, while Table III gives similar information of men prepared at "poor" schools.

(1) Failed, dropped, or conditioned.

Table 2, Good Schools

2 and 3 years

Total number.....	251	men	
Passed	208	"	82.7%
Failed (1).....	43	"	17.3%
Passed on re-examination..	20	"	(46.5% of Failed)
Total with clear record in biochemistry	228	"	87.7%

Table 3, Poor Schools

2 and 3 years

Total number.....	61	men	
Passed	34	"	55.6%
Failed (1).....	27	"	44.4%
Passed on re-examination..	9	"	(33.3% of Failed)
Total with clear record in biochemistry	43	"	70.4%

This analysis is of value in classifying our matriculants. It indicates where added instruction, but not spoon-feeding, may be judiciously applied.

DISCUSSION

DR. IRVING S. CUTTER, Chicago: I am strongly impressed with Dr. Farmer's exposition of the teaching of biochemistry. One thing which deserves attention is the rather large individual freedom which he permits his students and, which I can certify is not abused to the point of loafing, but proves really stimulating. Another important point is his correlation with clinical medicine for he has made biochemistry a real working tool and his students are able to think in biochemical terms.

(1) Failed, dropped, or conditioned.

THE TEACHING OF BACTERIOLOGY IN THE MEDICAL CURRICULUM

K. F. MEYER

University of California School of Medicine

The knowledge contributed by Pasteur and Koch rapidly found its way to America, and before 1885 the pioneers, Surgeon General Sternberg, at Washington, D. C.; W. H. Welch, at Johns Hopkins; T. Mitchell Prudden and Hermann M. Biggs, in New York; A. C. Abbott, in Philadelphia, and others began to teach bacteriology. The far-reaching applications of microbiology to medicine subsequently forced every medical school to offer instruction in this science.

Bacteriology, though primarily a purely biologic science, owes most of its actual development to the study of pathology, in particular the genesis of a large number of diseases. It is not unlikely that this connection was in part responsible for the existence of subdepartments or subdivisions of bacteriology in the department of pathology, whereas the influence of the early instructors lead to the teaching of bacteriology in connection with hygiene or preventive medicine. The instruction of bacteriology in twenty-nine of sixty-one medical schools or colleges is incorporated in the departments of pathology, in ten schools it is in the department of hygiene and in one school in the department of biochemistry. Independent departments of bacteriology are in existence at twenty-one, or about one-third of the schools.

There is no doubt that the correlation of pathology and bacteriology in the curriculum is ideal and essential to the interest of both subjects. Bacteriology, however, now provides so many procedures of direct application in clinical diagnosis, treatment and preventive medicine that the present tendency to remove it from its former accessory position and develop it as one of the major departments is quite logical and fully justified. In this respect great advances have been made in America over the traditions of the European continent where bacteriology is merely treated as a subdivision of the Institute of Hygiene or given as a separate course at one of the Pasteur Institutes.

The future of the independent department at the medical school is assured, provided a new orientation takes place in the character of the instruction. Many interesting experiments along this line are in progress but the chair of bacteriology is still young in the history of the university and lacking the historical traditions of older foundations must gain in prestige largely by its teaching and scientific achievements. A period of quiet adjustment and correlation is essential. However, it is already evident that those in charge of the independent departments are not satisfied with their lot and subdivisions and subdepartments of immunology, protozoology, hygienic laboratory practice, etc., are being considered and organized. The desire to subdivide a major medical science which Feer (*) so aptly calls "Verfächerung" is unfortunate. Physiology, the most important laboratory science, is usually taught as a unit and in some of the clinical departments in which specialization is necessary the tendency is in the direction of unification.

An undergraduate laboratory course in bacteriology must impart sound knowledge of fundamental facts and principles and a reasonable understanding of the methods and procedures which are within the scope of the general medical worker. Subdivisions depending upon the size of the teaching staff in the department lead to the creation of a large number of lectures and courses. In this way the department expects to justify its existence and the request for larger appropriations. It assumes more and more teaching responsibilities and in order to carry out these obligations consumes all the energy, enthusiasm and funds which should be used for the training of special workers in this branch of experimental medicine. Furthermore, the instructors are rarely called on to glance beyond the confines of the subject with which they are intimately acquainted. They are, therefore, frequently unable to draw broad generalization so useful to the student. The orthodox belief that effectiveness in teaching gains by restricting the instructor to such subjects or phases as he can know from his own limited research is disproven by some of the prominent teachers in this country and abroad. Aside from the obvious effect on the department one must consider the student who is required to

*Schweiz. Med. Wchnschr., 1920, 1, p. 292.

take all the separate lectures and courses. He frequently will burden his already overloaded curriculum far out of proportion to the benefit he derives from such specialization. Then there is an ever growing danger that it becomes more and more difficult to retain the subdivisions as entities. Unquestionably this instability will continue to a greater degree as new knowledge accumulates. But for the time being, it is well to preserve the undergraduate instruction of bacteriology as an entity and to provide such elective courses as may be needed for the training of special workers.

The position of bacteriology in the curriculum now deserves some consideration. It is usually taught in close conjunction with or prior to pathology and clinical microscopy. On the continent, on the other hand, instruction in the subject is, as a rule, given in form of a comprehensive six to eight weeks course at the end of the eighth or ninth semester or it forms part of the weekly exercises of the seventh, eighth and ninth semester. In any case, bacteriology follows the instruction in general and special pathology. The student has already seen clinical cases; he appreciates the value of laboratory diagnosis, the biologic treatment and the significance of the preventive measures which are based on bacteriologic information.

In America, the situation is often not so fortunate. In some schools the students reach the courses in bacteriology in a virgin state of mind as to all matters pathological. In other words, the curriculum places bacteriology before pathology. When to this predicament is added the geographic separation from a hospital, and when the purely scientific viewpoint of an academic university department is expounded by an instructor without any or at most a limited training in pathology, it is by no means surprising to find that the students have been taught a few technical tricks but not the broad comprehension necessary to an understanding of the etiological development of the infectious diseases. Bacteriology under these circumstances instead of being one of the key courses for clinical teaching is merely another interesting course in biology. An instructor conscious of this predicament may save the situation by spending the major part of the time intended for his subject in the interpretation of terms and of pathologic processes constantly met with in the study of disease

producing organisms. When he, furthermore, devotes a sufficient number of his lectures and exercises to an exposé of the principles of general bacteriology, little opportunity is afforded to lay stress on the relation of the science to preventive medicine.

That these disadvantages react unfavorably throughout the entire curriculum is amply supported by the comments from the teachers in the clinical branches and in hygiene. The only solution which suggests itself is to teach bacteriology in the orthodox fashion either in connection with or preceded by pathology. This deserves the attention of those interested in medical education. Would it not be advisable to bridge the gap from anatomy, physiology and biochemistry to bacteriology and clinical diagnosis by an introductory course on the biology of disease or general pathology? The overshadowing influence of morbid anatomy as frequently taught in the courses on pathology would readily be moderated by a propaedeutic lecture course or demonstrations on functional pathology.

In this connection, ample opportunity would be afforded to exemplify the value of the experimental method in the study of disease. The students would gradually familiarize themselves with the medical terminology, which they are expected to use during their entire career. The value of medical clinics to the first year classes, as advocated by various schools, would be enhanced and the existing contrast between normal and abnormal, between laboratory and bed-side could be softened in an ideal manner. It certainly would be easier to describe the course of an infection, to sketch the clinical picture or to discuss a temperature curve of a patient subjected to biologic treatment after the student has been taught some of the principles on which the information is based. During the last year the University department of bacteriology offered such a course and it was surprising to note how the interest and the curiosity of the students in things pathological was stimulated. Although primarily intended for medical students, this course may be taken to advantage by students in the biologic sciences. Why should not a student in biology, parasitology, plant pathology or home economics know something about the fundamentals of pathology of man or animals? Little enough interest is created in the study of comparative pathology of fishes, birds, insects, etc. When modern general pathology is

considered as a part of biology and presented as a natural science in a University department it will become a part of the pre-medical training and all the present disadvantages will be automatically eliminated.

It has repeatedly been suggested that medical bacteriology should be taught at the bedside and therefore during the clinical years. The instruction should be separate from clinical pathology. A plan of this sort is feasible for schools housed with wards and equipped with infectious disease pavilions, but the advantages of this rearrangement of the curriculum are unquestionably overestimated. In practice numerous difficulties seriously hamper the organization of a well correlated and well balanced course. Even under ideal conditions the clinical material in communicable diseases varies very much. The bacteriologic course would have to be extended over several semesters and quite often it would reduce itself to a study of the ward cases which are observed at irregular intervals. There may be an abundance of rare infections and consequently the instructor may be forced to discuss the common diseases in form of illustrated lectures or laboratory demonstrations just as he would if the course were given during the preclinical years. On the other hand, the great value of clinico-bacteriologic conferences, an analogue to pathologic conferences, during the clinical years before the combined student body of the third and fourth year cannot be overestimated and should be made a part of the curriculum. During these conferences it must be emphasized with unremitting insistence that the question of laboratory procedures and their interpretation are matters for consultation between the clinician and the bacteriologist. These informal conferences held once or twice a month are greatly appreciated by the students since they offer an excellent opportunity for stimulating correlations and the discussion of everyday questions submitted by the clinician and the students.

One must now consider the question of preliminary instruction. Theoretically, a short course in the elements of microbiology and general bacteriologic technic offers many advantages provided the advanced instruction follows immediately. If, however, two or three semesters are permitted to intervene and medical bacteriology is given during the clinical years it becomes necessary to repeat a great part of the elementary instruction particu-

larly the technical methods required in the study of the pathogenic organisms. In fact little is gained. Experience with science students who are permitted to attend the course in medical bacteriology after they have had a broad training in the biological sciences and have attended a course in general microbiology or its equivalent (176 hours) supports this statement.

A method of instruction which makes use of the concentration system is by far the best. Daily exercises (70 to 80 days) over a period of from two to three months are better than instruction with one or two weekly laboratory periods scattered over two, even three semesters. In this respect the continental instruction in bacteriology is more consistent than that of many American medical colleges. Probably in no other laboratory science is continued observation and correlation of the daily results of such importance than in bacteriology. Diagnostic methods can neither be taught convincingly nor correctly by a curriculum that does not allow the student to make daily observations. In clinical as well as public health laboratory practice a diagnosis must be furnished in the shortest possible time. How can a student be made to realize the importance of abbreviated laboratory methods when he is forced for example to spend two or three weeks on a simple typhoid stool diagnosis? Until academic freedom constitutes a part of the stronger institutions, it is obviously imperative to arrange the bacteriology curriculum in such a manner that conflicts with other courses are avoided and yet a speedy and logical execution of the necessary laboratory exercises is possible in the allotted time. It is needless to emphasize that the laboratory should be open at all times and students should be allowed to spend the spare time at their discretion in the study of the special problems which may be assigned or selected by them at the suggestion of the instructor.

THE GENERAL PLAN OF TEACHING BACTERIOLOGY AT THE UNIVERSITY OF CALIFORNIA

The general plan of teaching bacteriology at the University of California Medical School can now be outlined. The course extends over a period of 16 weeks and occupies four whole afternoons, with four hour lecture periods. In a general way, the subject is conceived as the natural history of infectious diseases

treated from a clinical and from a public health point of view. The latter conception is readily impressed on the student by pointing out how a mistake in the clinical diagnosis of an infectious disease unsupported by a laboratory examination may result in an extensive and fatal outbreak and that besides the medical attendant and the patient the third factor—the general public must be considered. This conception, by no means new, begins with the study of a bacterial disease at the bedside, reviews the clinical aspect of the patient, the diagnostic laboratory procedures and their interpretation, the biologic treatment if any in the light of the immunologic reactions, the communicability of the malady and finally the direct and indirect preventive measures which are commonly practiced. In other words, a student is shown that the study of the microorganisms in their relation to disease, in fact the work of the bacteriologist begins at the bedside passes through the laboratory and ends again with the patient or in the community. Furthermore, it is emphasized that the bacteriologist specializes in the laboratory study of patients in cooperation with the physician. He must, therefore, instruct himself by correlating what he finds in the laboratory with the clinical signs and symptoms of the patient.

The purely scientific part of bacteriology is not overlooked but the bacteria are treated not so much of what they are as what they do.

The object just outlined is attained by means of lectures, demonstrations, practical laboratory exercises, assigned problems in infection and immunology, theses on preventive medicine and occasional field observations. In the lectures, profusely illustrated by lantern slides, the student is systematically acquainted with the symptomatology of the disease, the mortality and morbidity statistics, the bacteriology of the causative organism, its pathogenicity as tested by experimental pathological methods, the pathogenesis in man, the mode of transmission and epidemiology, the clinical and public health laboratory diagnosis, the natural and the artificial immunity, the diagnostically important immune bodies and their reactions, prevention and control. The illustrations, as a rule, cover the following subjects: characteristic temperature curves, vital statistics, important clinical lesions and significant macroscopic and microscopic post mortem findings,

epidemiologic data and administrative material which demonstrates the practicability of community protection by vaccination or other preventive measures. Abundant data supplied by the State Board of Health and the State Hygienic Laboratory are used freely in this connection. The principle that every statement or generalization is open to direct or indirect experimental proof is followed in the selections of the illustrations and the preparation of the demonstrations. In the course of the lectures and throughout the regular laboratory exercises the student is furnished with references to recent publications on the subject under discussion and he is encouraged to broaden his knowledge by collateral reading.

It is the ultimate desire of the staff to eliminate systematic lecturing, and to assign to the students printed sections of the lectures which are now in the course of preparation. Time allotted to lectures can more profitably be used to critical reviews or in conferences with small groups of students. Complicated immunologic phenomena are demonstrated by special papers or experiments which are prepared and presented by one or two students. Every experiment embodies a number of fundamental principles and the technical execution is left to the ingenuity of the workers.

In order to economize in time and material, a brief outline with comprehensive references is supplied. The student is shown that without an adequate knowledge of the historical and theoretical facts it is impossible to comprehend the purpose of the experiments and to plan intelligently the intricate tests which are required to solve the problem. Before the student begins his experiments he must submit an outline for review and criticism. When he has demonstrated his findings he files with the instructor or the librarian a paper which embodies in a critical form the results of his investigation together with a complete and accurate bibliography. The reports are on file in the library in order to enable the members of the class to make abstracts in case they failed to take notes while the paper was presented.

During the regular laboratory exercises the students work consecutively and repeatedly with such essential morphological, biochemical and serological methods as are commonly used in the clinical and public health laboratory diagnosis of infectious

diseases. Significant biochemical or physico-chemical phenomena which may help to explain the theoretical background of a procedure, are demonstrated or discussed in papers assigned to and prepared by students. Emphasis is placed on the careful clinical observation and the systematic autopsy of experimental animals.

The value of assigned papers has been tested with a great deal of success. Early in the course twelve hypothetical epidemiologic problems are distributed. The students are required to find in the literature the information which enables them to submit by the end of the semester a well written exhaustive and critical thesis. Among the thesis problems thus far assigned the following two are representative of the character of the questions involved:

Problem 1: In a Northwestern city with a low mortality rate, the physicians report to the health department in the course of a few days approximately seventy-five cases of a disease with the following symptoms: headache, malaise, temperature with definite remissions, lenticular spots on skin, loose evacuations, leucopenia, positive Diazo reaction of the urine. A large proportion of the cases occur among women and children and the death rate is very high. The water supply is perfect. How would you diagnose the disease by bacteriologic and serologic methods? How would you determine the source of infection? What food would you suspect? How would you proceed to prevent further cases from the same source and how would you prevent contact cases? Consider in detail the various possibilities from an epidemiological, bacteriological and immunological point of view.

Problem 2: A physician is called to see a hunter living in Monterey County. The patient has a high temperature, severe headache; is very weak and sometimes irrational. His right axillary lymphnode is very painful, hard and imbedded in periglandular edema. What disease does the physician suspect? What steps does he take regarding this case? How does he treat the case? What public health laboratory and control measures will be instituted? How did the patient contract the infection? Discuss the subject in the light of California conditions.

Protozoology has been eliminated from the instruction and is now taught in connection with medical zoology during the second half of the second year. The first three weeks of the course are devoted to a brief consideration of general microbiology and

technic. Little time is devoted to the preparation of culture media since it is a common experience that students with a knowledge of biochemistry can easily learn the necessary technic. Physicians are nowadays rarely called upon to make their own cultures while those specializing in bacteriology will learn the value of properly prepared media in the advanced courses provided for this purpose.

Organization of the Instruction: In order to carry out the programme just outlined an organized staff and a well equipped laboratory are prerequisites. The various duties of the instructors and assistants are distributed as follows:

(a) An instructor or assistant with two technicians is in charge of the culture media department. This division supplies all the glassware and media which are needed for the regular laboratory exercises. The special media required in the experiments are prepared by the students assigned to the problems. Used test-tubes, pipettes, flasks and Petri dishes are cleaned in a central cleaning kitchen under the supervision of the culture media department. The students should not be called upon to spend the limited time at their disposal in mechanical cleaning work which can be done by technicians. Many courses in medical bacteriology are notorious on account of the excessive amount of cleaning work which is required to conduct the obligatory exercises.

(b) A senior instructor with considerable experience guides the special problems. When necessary he demonstrates the surgical procedures and reviews the results and the experimental data before they are presented to the class either in conjunction with the lectures or at special conferences.

(c) The first course technician, usually an assistant with several years experience in clinical bacteriology, is responsible for the preparation of the cultures, the infected animals and the diagnostic sera, etc. It is equally his function to collect from the hospitals, the hygienic laboratory, etc., the various clinical specimens which are used in the exercises and to maintain a set of stock cultures with a complete record of the biochemical reactions.

(d) The second course technician is responsible for the preparation of the reagents, the staining, the buffer and the indicator solutions, and the setting up of the special equipment as dark field illumination, etc.

(e) The supervision of the animal house and its caretaker are in the hands of a senior member of the staff.

(f) A group of not more than twenty-five students is under the supervision of a teaching fellow. These positions are usually filled by graduate students and candidates for advanced degrees. At regular intervals the fellows exchange their groups in order to become acquainted with every member of the class. The senior teaching fellow is also responsible for the classroom demonstrations.

Experience has shown that for a class of seventy-five students not less than eight instructors and two technicians are required to handle the details of the course. However, the staff is always heavily burdened and only the exceptional worker can find the time to attend to his research. It is well to realize this fact and to recall the timely warning of Theobald Smith: (*) "The time has come when the genuine research worker should be relieved of all teaching excepting in his special field. Similarly the successful teacher should not be expected to carry on continuous research while he is actively teaching." Quite often recent graduates with little or no experience in teaching are placed in charge of the laboratory work. Many of the present day defects in medical curricula are aggravated by the common practice of department heads to shift the difficult and important teaching to workers, who should first do some elementary teaching and then research in order to keep themselves fresh and inspiring. Would it not be better to give these workers an opportunity to become thoroughly acquainted with the field of bacteriology before they are placed in such responsible positions? The training and the utilization of subordinate workers in teaching is just as important a function of the department as the teaching of large classes or continuous research.

The usual laboratory equipment is quite sufficient for the regular exercises. Separate rooms for the execution of the problems in experimental pathology and immunology are a great convenience. The location of a complete reference library close to the laboratory or lecture room offers many advantages to the students and the instructors.

*Address given at the University of Nebraska, Sept. 24, 1920, p. 8.

Herewith is now presented the teaching arrangement as followed during the fall semesters of 1924 and 1925. The details and the general laboratory instructions have been published in the University of California Syllabus series No. 179, University of California Press, 1925.

MEDICAL BACTERIOLOGY AND IMMUNOLOGY

WEEKLY PROGRAM: FALL SEMESTER, 1924

FIRST WEEK. Lectures and Demonstrations: The historical development of the study of infectious diseases inclusive, the epidemiology, immunity and preventive medicine. General morphology, finer structure, mode of reproduction and classification of bacteria, yeasts and molds.

Laboratory: Preparation and sterilization of glassware; preparation and use of stains; examination of organic infusions; qualitative examination of aerobic bacterial in the air.

SECOND WEEK. Lectures and Demonstrations: General physiology and chemistry of bacteria.

Laboratory: Systematic study of pure cultures; examination of yeasts and molds.

Experiments: Staining methods for distinguishing dead and living bacteria; mechanism of Gram stain; the optimum P/H of bacterial growth; demonstration of involution forms; luminescent bacteria.

THIRD WEEK Lectures and Demonstrations: Food requirements of bacteria; enzymes; the products of metabolism and their demonstrations.

Laboratory: Isolation and cultivation of bacteria; culture media; the method of disinfection.

Experiments and Conferences: Presentation of disinfection experiments; one cell culture methods; bacterial mutation.

FOURTH WEEK. Lectures and Demonstrations: Fundamental factors of pathogenicity and infection; general phenomena of immunity.

Laboratory: Study of experimental anthrax infection; the spore-bearing bacilli related to B. anthracis.

Experiments: Bactericidal action of normal sera; fever; inflammation; preparation of a vaccine; cuti-infection and cuti-immunity in anthrax.

FIFTH AND SIXTH WEEKS. Lectures and Demonstrations: Gastro-intestinal bacteriology; typhoid and paratyphoid fever; food poisoning.

Laboratory: Examination of infant and normal adult's stools; isolation and identification of members of the colon-typhoid group from stool specimens.

Experiments: Pfeiffer's phenomena in vivo and vitro; effect of salt on agglutination; acid agglutination; protection of guinea pigs against *B. aertryke*; artificial antibody production (6 experiments); phenomena of co-agglutination (3 experiments).

SEVENTH WEEK. *Lectures and Demonstrations:* Bacillary dysentery in adults and children; cholera; essentials of water bacteriology and sanitation.

Laboratory: Widal reaction; isolation and identification of organisms belonging to the group of dysentery bacilli; water analysis.

Experiments: Precipitins (3 experiments); action of Shiga toxin.

EIGHTH WEEK. *Lectures and Demonstrations:* Undulant fever; plague; tularemia; bacteriology of milk in its relation to disease.

Laboratory: Identification of the organisms belonging to the *Brucella* group; study *B. pestis*; bacteriologic examination of milk and ice cream.

Experiments: Agglutinins in milk; leucocytosis; action of marco' and microphages; the reticulo-endothelial system in relation to antibody formation; opsonins; bacteriotropins.

NINTH WEEK *Lectures and Demonstrations:* Tuberculosis and leprosy; diphtheria.

Laboratory: Methods of staining and of isolating tubercle, leprosy and smegma bacilli; demonstration of tuberculosis by animal tests; laboratory diagnosis of diphtheria.

Experiments: Differentiation between human, bovine and avian tubercle bacilli; tuberculin test; standardization of diphtheria anti-toxin; Schick and Kellogg test; virulence and toxicity tests for diphtheria bacilli; diphtheria anatoxin.

TENTH WEEK. *Lectures and Demonstrations:* Staphylococcic and streptococcic infections; tonsillitis; scarlet fever; phagocytosis.

Laboratory: Isolation and identification of organism of the staphylococcus and streptococcus group; buccal and throat flora.

Experiments: Experimental pyemia; septicemia and empyema; staphylolysin; streptolysin and antistreptolysin; agglutination of staphylococcus and streptococci; focal infection in the rabbit.

ELEVENTH WEEK. *Lectures and Demonstrations:* Respiratory infections; pneumonia; the bacteriology of sputum.

Laboratory: Study of sputum flora with special reference to *Diplococcus pneumoniae*.

Experiments: Production of *Streptococcus scarlatinae* toxin; Dick test; experimental pneumoniae in rabbits; protective value and specificity of antipneumococcus serum; iso-agglutinins and isohemolysins; clinical matching of blood.

TWELFTH WEEK. *Lectures and Demonstrations:* Epidemic cerebrospinal meningitis; influenza and whooping cough; the bacteriology of spinal fluid.

Laboratory: Study of *Micrococcus intracellularis meningitidis*

and *B. influenzae*; methods of detecting meningococcus carriers; identification of the microorganisms in specimens of spinal fluid.

Experiments: Properties and titration of complement; artificial and heterophylic hemolysins; Bordet-Gengou reaction; anticomplementary property of sera.

THIRTEENTH WEEK. *Lectures and Demonstrations*: Gonococcal infections; glanders; streptothricoses; blastomycosis, sporotrichosis and coccidioides immitis infections; hypersensitiveness and anaphylaxis.

Laboratory: Study of *Diplococcus gonorrhoeae*; *B. mallei*, pathogenic fungi and branched bacteria.

Experiments: Active and passive anaphylaxis in the guinea pig and rabbit; Arthus phenomenon; Dale technic; hypersensitiveness, preparations of diagnostic fluid extracts of food, pollen, etc., zootoxins.

FOURTEENTH WEEK. *Lectures and Demonstrations*: Gas gangrene; tetanus and botulism; standardization of tetanus antitoxin.

Laboratory: Study of anaerobic sporulating bacteria.

Experiments: Tetanus intoxication in animals; influence of temperature on natural immunity of the hen against tetanus; action of antitetanolysin; typing of *Cl. botulinum-antitoxin*; demonstrations of *Cl. botulinum* in food.

FIFTEENTH WEEK *Lectures and Demonstrations*: Spirochaetoses; syphilis, yellow fever and epidemic jaundice.

Laboratory: Methods and technic used for the study of spinal organisms.

Experiments: Wassermann reaction; Kahn test; chemotherapy.

SIXTEENTH WEEK *Lectures and Demonstrations*: Typhus and Rocky Mountain fever; diseases caused by filterable viruses in particular poliomyelitis, encephalitis, herpes febrilis, rabies and small-pox.

Laboratory: Study of cell inclusions, rickettsia bodies; examination of unknown cultures.

Experiments: Experimental herpes and rabies; small-pox diagnosis, vaccination and immunity test; Weil-Felix reaction; bacteriophage phenomena.

TEACHING OF PRACTICAL CLINICAL LABORATORY WORK

C. C. BASS

School of Medicine Tulane University of Louisiana

The chief function and the primary object of the medical school is to train its students to become good practitioners. What the people need is physicians who will ably and conscientiously diagnose, treat and prevent the diseases and injuries which arise. to the end that men may live longer, happier and more useful lives. The purpose of the medical school is to prepare prospective physicians to meet this need. Incidentally, it is true, the medical school is also, more or less, a seat of research leading to new information but after all the greatest function is to pass on to others the knowledge we already have and to prepare them to receive and make practical application of new information that may be brought to light from time to time. I would not detract from the importance of research and its encouragement in every way possible. However, most of the students in the medical school will later become practitioners and will not engage in research, nor will they be prepared to do research except in so far as all physicians engage more or less in investigation all the time in connection with their services to their patients. These remarks are made to emphasize the idea that the ultimate, chief object of teaching any subject in the medical school is to prepare students to become the most efficient and useful practitioners.

Correct diagnosis is essential for the best treatment and management of disease. Without good diagnostic ability and judgment, a physician's usefulness is much less than it would be otherwise. Not only must he have diagnostic ability but he must have established such habits of conscientiously using the different means of diagnosis at his command as to make their use a perfectly natural procedure with him. These habits are to be established largely during the student and intern period. If not then, they are not likely to be established later. Therefore, the teaching of

any subject in the medical school, including the particular subject under discussion, Clinical Laboratory Diagnosis, should be so conducted as to establish such habits of performance, employment and application as will be most useful later in practice. Technic must be good, their employment must not be neglected, and wise interpretation must be made. One who employs faulty technic might almost as well do nothing; one who knows good technic and is able to make reliable examinations but neglects to make them might as well not know how; one who has the correct laboratory findings but has not the knowledge and good judgment necessary to enable him to place the proper interpretation upon them might about as well not have the information at all. The teaching of clinical laboratory work in the medical school, therefore, involves teaching of proper technic, proper employment of laboratory methods and proper interpretation of laboratory findings.

The purpose of this paper is to discuss when, where and how these should be taught. What we have in mind and wish to embrace under the head of clinical laboratory work for the purpose of the present discussion, are the ordinary clinical laboratory tests or examinations that can and should be employed in regular practice of medicine, whether these be microscopic, chemical, serologic or bacteriologic, etc. We do not wish to include tests and examinations that require for their performance elaborate facilities and equipment and the special technical ability of the laboratory expert. We wish to include only those that can be made by the properly equipped and trained practitioner, entirely independently of others. We include especially the routine blood examination, total and differential counts, cytological study for pathologic cells, examination for malaria and other parasites, hemoglobin and color index estimation, typhoid and other agglutination tests, etc.; routine examination of the urine microscopically and chemically; examination of the feces, microscopically for protozoa, parasites and ova, and chemically for blood, etc.; examination of sputum for tubercle bacilli and other pathogenic organisms; routine gastric analysis chemical and microscopical; examination of throat cultures for diphtheria especially; and examination of suitable preparations of pus, exudate, scrapings, ect., for gonococci and other bacteria, spirochites, etc.

All of these and a good many others can be made with entire satisfaction by the regular practitioner with his own equipment which need consist only of a microscope and a mere handful of additional apparatus stains and reagents, and also knowledge of how to use them. Elaborate equipment is not needed and is really in the way. Such limited laboratory equipment must be a part of the available outfit of any practitioner before he has a just claim to be trusted with the responsibility of the health and life of patients. He has no right to practice either general medicine or a specialty without this much equipment for clinical laboratory examinations. The cost of such equipment is so small and so little space is required that these cannot be made an excuse for not having it.

The medical student should learn to do his work with the kind of equipment and facilities that he will have in practice later. It is a great mistake, and entirely unnecessary, to teach students these simple procedures in elaborately equipped laboratories and with complicated expensive apparatus and facilities which he cannot and should not have when he gets out. He is not able to adapt himself to the use of the limited equipment he can and should have. The tendency is for him not to employ laboratory examinations in his practice, or, what is almost as bad, to send them (relatively few, of course) to laboratory specialists. The practitioner who depends upon laboratory specialists to do his laboratory work simply doesn't have much of it done. He guesses instead. It is not practical to send away all the laboratory work that ought to be done in the course of a busy practice, except perhaps in the case of groups, group clinics and hospitals. More or less laboratory work is indicated and needed in practically every case seen of whatever nature. Unless it is done the patient does not receive the quality of service he wants and has a right to expect.

There are many different technical methods of making most of the different routine laboratory examinations we have in mind. Some are poor, awkward, and especially not the most practical. Others are simplicity itself. The methods taught to students ought to be selected for their simplicity and practicability. The student is not able to make wise selections of methods as the teacher in charge ought to be. Therefore, I believe the giving of

a technical course such as is given in most, if not all schools, under the head of clinical microscopy, clinical pathology, or clinical laboratory, is quite essential. In this course the student should learn to employ good technic in making the routine laboratory tests that he will continue to make on patients, as student, intern and later, practitioner.

The proper good technic learned in this course is perfected by the continuous practice of it that should follow. The student who has had the course should be able to make all of the laboratory examinations indicated above as a part of his examination of patients and he should be allowed or required to do so.

Whether this course in clinical laboratory technic should be given in the second year as in many schools or in the third year as in some, depends somewhat upon the arrangement of other work but particularly upon the time at which the student will begin to make laboratory examinations as a part of his examination of patients. If he begins this at the beginning of the third year he should by all means have his course in laboratory technic during the latter part of the second year. If, on the other hand, he will not do the laboratory examinations as a part of his examination of patients until the fourth year then it is as well and in fact better that his course in clinical laboratory technic should come in the third year.

After the student has learned his laboratory technic the next thing is for him to learn to employ it in the routine examination of patients. Here is where I believe there is room for a great deal of improvement in many institutions. The student should learn that the laboratory examination is a part of the examination of the patient. It should no more be omitted than the history or the physical examination and it should no more be delegated to someone else than the other parts of the examination. There is no more excuse for the student or physician who examines a patient to call upon a specialist or technician to make the ordinary clinical laboratory examinations than there would be to get someone else to make the physical examinations or take the history. As a matter of fact the student should never be allowed to omit from the examination of any patient assigned to him any routine or especially indicated laboratory examination that he can do him-

self. Doing the work himself establishes good habits as to employing the useful and practical laboratory tests.

It is important for the hospital and teaching staff to set good examples before the student with regard to laboratory examinations. To tell a student that he should make the proper laboratory examinations on all of his patients and to let him see you and others, whose leadership he is expected to follow, not doing this and neglecting it, defeats your purpose. Wards without ward laboratories and dispensary services that do not include laboratories have a bad influence over students in this regard. Clinicians, whatever specialty they teach, who are not familiar with and who do not employ clinical laboratory methods also have a bad influence over students in this regard. The ophthalmologist who sends away pus specimens from the eye to be examined microscopically, the internist who sends away blood specimens to be examined for malaria, the man in venereal diseases who sends away material to be examined for treponema, the dermatologist who sends away material from skin lesions for microscopic examination, the surgeon who sends material from a suspected malignant pustule, is setting a bad example before his students and he is not helping them as much as he could to prepare themselves to do the best practice on their own responsibility later. There are so many, however, whose own training was such and whose present interest and enthusiasm lies in other directions to such an extent that they do not in their own work set a good example before students.

The student must also learn to make proper interpretation of laboratory findings if they are to be of much value to him. This must be learned while studying cases. He must learn to interpret the laboratory findings in the light of the other information in the case. To place undue significance upon a laboratory report and disregard or minimize other, perhaps more valuable, information may be a greater mistake than not to make the examination at all. Here again the example of the teacher largely determines the student's attitude and future utilization of this valuable asset, the clinical laboratory. The example of conservative and studied interpretation of the laboratory findings in the light of information from other sources, constantly before the student, establishes in him similar habits of application.

Please do not misunderstand me to be a laboratory enthusiast. Quite to the contrary, I am very much opposed to overemphasizing laboratory methods, as is often done to the neglect or depreciation of other equally invaluable and sometimes much more valuable procedures.

To summarize, I believe the teaching of practical clinical laboratory work should consist of giving a course of instruction in well selected, simple and practical technic, followed by the example set by teachers and staff and by the practice on the part of the student of constantly making and employing the proper laboratory examinations as a part of the routine examination of patients. Those who have such experience as students and later as interns will be the better prepared to do good practice afterwards.

DISCUSSION

ON PAPERS OF DRs. MEYER AND BASS

DR ALEXANDER C. ABBOTT, Philadelphia: I congratulate Dr. Meyer on his excellent description of what is done at the University of California. I do not suppose any of us organize and perform these services in precisely the same manner. Most of us have taken conditions as we found them. Like Topsy, the work has "just growed," in most schools.

The school with which I am identified gave me the rather unique privilege of organizing definitely and at an early date a university department of bacteriology, which means that the teaching of that subject is centralized in our department and the instruction offered is adapted to the needs of students from the various schools of the university.

At the present time, the instruction going on in the laboratory is of a general educational character. There is a class that spends ten hours a week in the laboratory and will do so for the next four months, made up of students from the department of biology, the department of botany, the school of education, where they are training to become teachers, and from the graduate school (not the graduate school of medicine). Not any of this group of students have medicine in mind, but are studying the subject for its general educational value.

After the first of February, we shall have a larger group of students from the Medical School. These will be taught the subject in its application to medicine, in its importance in the interpretation of various infections, with a consideration of special infective diseases, and the biological and bacteriological methods of preventing

them, and the application of bacteriology to general questions of public health, preventive medicine and sanitation.

I am not at all sure that our plan is better than that of others, but it works pretty well. Some of Dr. Meyer's suggestions will, I think, be utilized by us in making our course better. I cannot, however, avoid the opinion that even though the work be centralized, as a university department, it is imperative that all departments whose investigation work requires elucidation or completion through bacteriological studies should possess their own equipment for that special work.

I feel, as does Dr. Meyer, that clinical medicine today cannot be taught or learned properly and completely unless both teacher and pupil have first hand acquaintance with certain simple things which, with ordinary good sense and reasonable training, can readily be learned.

While Dr. Bass was speaking, I recalled an incident that fully brings out the point I am sure he had in mind. Some few years ago, at an important medical meeting, a distinguished clinician presented a paper on an obscure clinical problem—I do not remember just what it was, but it was accompanied by a very elaborate laboratory analysis of the blood from the cases. When the discussion of that paper came, it centered entirely on the laboratory analysis as given in the paper, and the reader of the paper could not take part in the discussion, for he had not done any of the laboratory work himself and knew nothing whatever about it. I have rarely found myself in so embarrassing and awkward an atmosphere.

DR. G. CANBY ROBINSON, Nashville, Tenn.: I approve very highly of Dr. Bass' paper. I feel that he is perfectly right in saying that the laboratory procedures are just as much a part of the examination of a patient as the history of the physical examination. That is something that we must constantly reiterate and emphasize to our students. The fact that students as practitioners are to go out and take care of patients as best they may puts on us the responsibility of making them perfectly familiar with the technique and with the interpretation, just as he said.

There is one point in Dr. Meyer's paper that I would like to speak of, namely, the possibility of dividing bacteriology. For instance, a general course in bacteriology may be given early in the curriculum and it can be given without reference to previous medical courses, but there are certain phases of bacteriology, especially serology and immunology, which should be given later in the course and correlated with clinical medicine.

I feel that Dr. Meyer's method is excellent, but the method of dividing the work is a possible alternative.

THE CONTENT AND CONDUCT OF THE QUIZ

IRVING S. CUTTER

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Teaching students how to study is of the greatest importance. We have no right to assume that students have learned how to study. If we do, we will fall far short of performing some functions that we should perform. There is so much matter that the student cannot avoid reading and studying. Much of this must be memorized or grouped so that it can be retained. Instruction in junior medicine and surgery usually consists of three lectures a week, an equal number of quizzes and a clinic or two. The lecturer, I take it, is functioning properly when he does not adhere strictly to a given text book but brings to the hour a little more illuminating subject matter than is found in the ordinary text book; bringing the subject down to date and injecting also his personality, some of his experiences, his enthusiasm and inspiration. The quiz which follows the lecture naturally must cover considerable matter and there are two types of quizzes that are of value:

First—that which confines itself strictly to the subject matter of the lecture. The student should prepare for the ensuing quiz by means of a syllabus or an outline of the lecture. With an outline or syllabus, younger quiz masters may be used to good advantage.

Second—that which resolves itself into a correlation hour in which students are permitted to ask questions, where the relationships of the subject matter may be discussed and where possibly new matter may be injected by the quiz master. For this style of quiz a quiz master of wider experience and larger range of instructional vision must be used.

Of the two types of quizzes, the first has the advantage of first helping the student to systematize and organize the subject he must learn. Review of the subject matter, essential with most students, is the rule in this type. If you have not organized

quizzes of the first type in your curriculum, you will find the students organizing them themselves. In many European schools groups of students employ an instructor to meet them for an hour, in the evening, to outline and review the subject matter covered in the lectures of the day.

For the second type of quiz, where correlation is the desideratum, quiz masters should occasionally change, and there should be brought to the quiz instructors from related departments.

I assume at the outset that there is no necessity or desirability that a lecture and quiz shall be combined. One of the most time-destroying instructional devices is the exercise where one attempts to combine instruction by means of a lecture and at the same time to quiz the students. The cross fire which the student takes advantage of defeats the purpose of the lecture or the quiz and usually both. The necessity of helping the student to find a way to study emphasizes the importance of the quiz. Many students have no conception of how to organize their work. The more closely the student can relate facts in sequential orderly form, the more easily will they be retained.

Quizzes may be termed unnecessary elementary instruction, tending to destroy the individuality of the student. I am sure this is not the case because of the tremendous mass of information which he simply must read and classify. The quiz which is over an hour in length and with a section of more than twenty students is also a waste of time. Better a section of ten to twelve students. In many of the subjects of the junior year, one quiz hour per week will suffice, if the work is arranged in syllabus form. If the time can be found, it is more desirable to have one quiz hour for each lecture hour. However, with some subjects, one quiz may cover the work of two lecture hours.

DISCUSSION

DR WM KEILLER, Galveston, Texas: I do not think it is possible to emphasize too much the importance of the graded quiz, especially for the early part of the freshman year. I know, in our freshman class, men come to us with the vaguest possible ideas of what they are up against. They have been having upon the whole rather a good and easy time in the academic department, as they ought to have because it is largely cultural and there is no time for culture in a

medical course. They have quite frequently, the brightest of them, required to get themselves oriented.

For example, they get their biology and dissect one or two vertebrate types and get the morphological point of view, and they have no idea at all what the requirements of human anatomy may be so that they think they know it when they do not know anything at all about it. Thus a few graded quizzes early (and they ought to have them in time) very soon lets you know where your students are and gives you a chance to say, "Look here, you are doing very poorly and our experience is that you are not going to do any better in your term examinations than in the graded quizzes. A man who is forewarned is forearmed and it is up to you, or you know what is coming."

I have already said I do not know anything about medical teaching, but I do still know just a little about anatomy, and we have two ways of giving what I call a written oral. I am a very firm believer in oral examinations, but you have not time to examine a large class orally often. It is going to take up more of your hours than you can afford. I have two ways of doing this.

One way is by reproducing on the mimeograph, for example, drawings of the bones and telling them to fill in and name certain processes. I give each man a drawing. It has to be a reasonably good drawing. Thank the Lord, I can draw! That is the only reason I am an anatomist.

I give them these and they put lines to the various processes, and they may shade in certain muscles, and so on, so that within a very short time they can answer, and answer in such a way as to show they have used their pictures, that they have visualized their anatomy. They can give you a very good idea how they are getting on with the study and teach themselves.

There is another excellent way I have worked out of giving the written oral and it is this: I take a picture say of a section of popliteal space. I have all my pictures the same size. I cover it over with a sheet of paper so cut out that it takes out all the names, and I substitute for the names certain arrows which are pinned on and I say, "Name a, b, c, d."

Of course, the picture has to be a good picture, but if a man has a visualized picture of his dissections it is perfectly wonderful how much information, how much real genuine knowledge of anatomy you may elicit in that way. I believe both these methods are valuable as short means of giving really valuable quizzes and also means for comparatively easy grading, as you can run over the answers to these questions with the instructor staff and they may grade by a certain number of plus and minus signs, or plus signs and naughts.

DR W. H. MACCRACKEN, Detroit: I would like to ask Dean Cutter where he gets his quiz masters. I have not the slightest doubt this plan may be very good, but my own observation is that competent

quiz masters who are able to quiz with skill are rather scarce Where do you get them? How do you train them?

DR B. C. H. HARVEY, Chicago: In using these quiz hours, which I have preferred to call conference hours, I have found that we can get in them one very valuable kind of information about our students, we can learn their characteristics and potentialities better in these informal conferences than in any other way and there is one particular use to which I have put the conference hour recently that seemed to me to have special value.

In that conference I gave to these students a written mimeographed statement concerning some work which they had covered both in the laboratory and in reading and in the lecture and I asked them to review that statement carefully and mark in it any things which were wrong and to write in the space between the lines—it was the double spaced—any words or phrases which they believed could well have been substituted for those I gave them.

I did that in the hope of discovering in these students any critical ability of which they were possessed. In the statement given to them, I deliberately inserted some things that were false or imperfect and then I read the replies and discussed matters with them at a later conference.

The results were startling. I found the students tended to have an attitude of supine credulity. They had been trained to believe what was told them and what they read. A few who had a critical attitude stood out, and through this conference I was able to discover which of the students possessed that extremely valuable quality of the student of medicine, the quality of criticizing intelligently the material presented to them. Those who were smitten with what Dr. Cabot calls the curse of receptivity, could possibly be saved later to some extent from the blighting effect of that curse.

D8 W. F. R. PHILLIPS, Charleston, S. C.; Dr. Cutter said, if I understood him correctly, that we hardly had the right to think that students knew how to study. If that is the case, what are our preliminary requirements doing for us? If the two college years demanded by the Association and the graduate degree demanded by individual members do not qualify the student to know how to study, why should we have them? I think that if we find the student unable to know how to study, it is a serious criticism on our preliminary educational requirements.

Now, I am asking that question, but I am in accord with Dean Cutter. I realize, and I suppose every person who has the freshman class to deal with realizes more so than those having later classes to deal with, that the student coming to us does not know how to organize his work, but, is it our business to do it? Of course, it is a necessity for us to do it, but ought we to do it? Ought we not throw this

problem back squarely to the undergraduate schools and let them know we are not finding the product they are sending us what it should be? I think we ought to give some consideration to that.

Speaking as to the quiz and lecture itself, I have found in my own work, I have had occasion to lecture, and I have found it very well to stop in the middle or in any part of the lecture and ask the student or students if they understand what I have been trying to put across to them, to pick out individually one or two students and say, "Do you understand what I have been trying to tell you? If you do not, ask me questions that I may go over it and repeat it."

I have found, as one of the speakers just said, that it is very good to have informal conferences. I have had them for years, held on some night in the week at which the student and myself try to get together on the purpose of our work. It is absolutely voluntary. They may stay as long as they want to. If the student does not feel that he is getting anything out of it, he goes away; if he is, he stays. They come prepared to ask questions of any nature whatsoever. The conference is of an informal, conversational nature, carried on without fear of any record being made of its revelations.

In this manner I feel I get closer to the student, find his difficulties, and am enabled to help him better than in the formal quizzes where the student always feels, it is my impression, that a record is being made and something is being put down there to be used on the judgment day to determine whether or not he shall go with the sheep or the goats.

DR IRVING S. CUTTER, Chicago: I think we cannot be sure, even when students graduate from the medical school, that they know how to study, and anything we can do to assist them in that direction is a matter of concern. You would be gratified, if you tried the outline form, to note with what thoroughness the students will cover the subject matter of junior medicine and junior surgery, whereas, unless they are directed in some manner, the information which they have is pretty general, in fact, to general to be of much use.

As far as Dr. MacCracken's question goes, you can use immature and young instructors if you use the outline form. All the instructor has to do is follow the outline and ask the questions. I think we should pay more attention to developing in our own groups men who will ultimately become good teachers.

THE CLINICO-PATHOLOGIC CONFERENCE

OSKAR KLOTZ

Faculty of Medicine, University of Toronto

The objective of every teaching laboratory-department in a medical faculty is the same—the inculcation of the scientific spirit with its methods of precision and a presentation to the student of the principles underlying health and disease so that he may intelligently address his actions to the sick and have a clear understanding of the clinical manifestations of disease. The methods of teaching utilized by the different departments to attain this end must necessarily differ and this is particularly true in the teaching of pathology wherein the subject for presentation not only demands a scientific mode of approach but also requires a clinical attitude for application. The subject of pathology lies midway between the fundamental preliminary departments of the medical curriculum and the clinical study of the individual cases of illness. In pathology the student must have a thorough knowledge of his preliminary studies in anatomy, physiology and biochemistry and he must be ready to utilize the information gained from each of these departments so that he may recognize the deviations from the normal and understand the influence of each of these upon the well-being of each patient.

Our methods of teaching of pathology are largely based upon those of the continent which began in the days of Virchow. In large part, the method consisted of studying at first hand the changes which take place in tissues and organs when injured and altered in their function. With the advent of bacteriology, the study of the commonest causative agents has been removed from the field of pathology and the latter has devoted itself to the observation of the sequence of changes occurring during the process of injury and during the phase of restitution. Thus the pathology of Virchow and his immediate successors became largely a study of gross and microscopic alterations in morphology as were found in spontaneous diseases of man.

Inasmuch as it was not always easy to obtain the various stages of a disease process when studying human tissues alone, the experimental method was introduced whereby it was hoped that similar diseases might be produced in animals and the lesions more easily studied during the process of development. Some fifteen years ago great efforts were made to have the experimental method applied to pathology to supplant the more stereotyped study of the gross and microscopic lesions of human organs. The experimental method was given a thorough trial but it was soon found that it could not be applied to the exclusion of the earlier mode of presentation inasmuch as the former required a greatly extended curriculum, and also because it was not possible to reproduce the processes of disease in animals as we see them in man. One of the most valuable applications of the experimental method is found in the teaching of inflammation where we note a great similarity in the reactions and the stages of the inflammatory process in different animals.

The method of teaching the scientific aspect of problems in pathology has been given a very good trial and has proved very satisfactory. The student, by means of animal experiments, gross materials and microscopic sections, is able to obtain a grasp of the principles underlying disease process in tissues. To a limited degree he is also able, by the experimental method, to appreciate the functional disturbance, but our own experience has taught us that the attempt at teaching the true character of functional disturbance of the human tissues can not be obtained through animal experimentation alone, but is better learned by the study of pathologic physiology at the bedside. In our attempts on the application of the experimental method to the teaching of pathology, we have found that the production of certain disease processes in animals has a widely different influence upon deranging the physiological capacity of tissues and organs than is to be observed in man, and it has been very discouraging to find that the truths gleaned from our animal studies were not always directly applicable to the human subject.

Hence, I think you will agree with me that although the teaching of pathology can be adequately performed in the laboratories by means of the study of diseased tissues and by the application of the experimental method, yet there is a wide gap which fails

to be bridged, linking this important subject to its clinical application in the ward. Pathological chemistry which is but an offshoot from biological chemistry, has attempted to add some information to link up the relation of the structural alterations and the clinical manifestations in the patient. Here again, however, the extent to which pathological chemistry can serve as an intermediate teaching factor seems to be limited to the analyses of fluids and the secretions of a few organs. And even here again, there is a failure of coordination inasmuch as this intermediate department of study can as yet not be directly correlated with the clinical findings nor with the pathologic alterations of the individual organs.

To assist in bringing the gap which falls between the teaching in the laboratory of pathology and that of the clinical departments, we have introduced in the final year of study the clinico-pathological conference. Our course in the medical school covers a period of six years, bacteriology being given in the third, general and special pathology in the fourth, postmortem pathology and the pathology of special systems (nervous, genito-urinary, gynaecology, bones and joints) in the fifth, while in the sixth year we round off our studies by the conjoined clinic given by the laboratories of pathology in conjunction with the staff of the clinical departments.

Before, however, discussing the value of the clinical-pathologic conference I wish to emphasize that the most important phase of the teaching of pathology lies in the proper presentation of the principles of pathology. When a student has thoroughly grasped the various processes which may involve the tissues and organs in changing their functional character, he finds little difficulty in applying these principles to the diseases of various systems. It is essential that he master the fundamentals of pathology wherein he is able to utilize the knowledge gained in anatomy, physiology and biological chemistry. The succeeding course in special pathology then becomes much easier and he can quickly familiarize himself with the most important pathological processes arising in various parts of the body.

There has always been an urge upon the part of the clinical departments that the student should be familiar with all the phases of pathology before he enters upon the clinic. This, as

we are well aware, is impossible to carry out with our present curriculum, nor do I deem it wise to attempt to segregate too abruptly the training that he receives in pathology during the time that is spent in the ward. Hence we find that there is a time period in the curriculum which cannot wholly be adapted to the desire of the student, the clinician and the laboratory instructor, but there must be a dovetailing of our efforts and the gradual ascension in the presentation of the most fundamental principles of our subject until we are able to arrive at that point when the student is able to logically interpret his clinical findings with the knowledge gained in the pathological laboratory. It is wholly improper to attempt to elucidate the principles of pathology by concentrating upon one anatomical system alone or upon some given clinical disease. The viewpoint which would thus be gained would be much too narrow and would tend to concentrate too great an attention upon the fundamental characteristics of pathological processes as illustrated in that one disease alone.

Hence, it is necessary to stress the importance of the early training which the student receives in his instruction in pathology leading up to the more special work which comes after.

During the last or sixth year in the medical school our student spends almost all his time in studying the cases in the wards. By this time he has received his instruction in physical diagnosis and is able to appreciate the characters of the clinical manifestations of the commoner diseases. To maintain his interest in the scientific interpretation of the disease, the clinico-pathological conference serves very well, not only to refresh his memory of the probable organic changes occurring in various tissues but also to have him understand disease complexes from the standpoint of pathological physiology.

These conferences are held once a week and during the year we attempt to cover the commonest diseases which he encounters in practice. On some subjects, as for example pulmonary tuberculosis, we spend two or three sittings so that we may more adequately discuss the different forms of human tuberculosis. This is also true with the discussion of heart and kidney disease. At these conferences there are present representatives from different departments depending upon the interest which the subject matter may elicit. Thus, anatomy, physiology, chemistry, bac-

teriology, pathology and the several clinical departments may be brought together to present the salient points bearing upon the problem. Not uncommonly we ask one of the students to present the anatomical and the physiological aspects and this is then followed by the presentation of the bacteriological and pathological phases of the discussion. The clinician presents his subject briefly and to the point, drawing from the antecedent presentations such points which have a bearing on the clinical diagnosis. Thus the entire presentation of the subject is of the nature of a symposium wherein the latest information concerning the problem of the particular disease is brought to the attention of the student. Following these brief presentations, which in all should not occupy more than forty-five or fifty minutes, the subject is thrown open for questions and discussion wherein the students participate. This discussion usually lasts for one-half or three-quarters of an hour and by the conclusion of the exercise, we find that the subject has been very well covered. These exercises are sometimes accompanied by the demonstration of fresh or museum specimens, charts and statistics, along with some lantern slides.

We have found that the students are quite enthusiastic respecting this course and they find that it gives an opportunity of more clearly coordinating an understanding of the integral parts of our knowledge concerning the common diseases. It is probable that there is but little new material brought to his attention but the student finds that it is the only occasion where he is able to round off the problem in an understanding of the importance of the fundamental subjects as applied to the clinical study of disease. For him it is a new method of presentation and when a subject is brought to his attention from the diverse angles of different departments, he realizes more fully the value of medical cooperation. The discussions which attend the close of the presentation by the various departments are likewise of great value in training the student to think of the bearing of various aspects in the study of disease which is not gained when viewing it in the light of a single department.

For the purpose of this type of conference we have found it inadvisable to have members of the student class present too large a part of the day's work. In the first place, the demand upon the student's time to properly prepare his thesis for such a symposium

is too great and his inexperience in the matter of presentation leaves much to be desired when only the salient points of discussion are to be brought forward. It is also true that the student body as a whole will not accept in confidence an exposition by one of their fellows as they do from one who has had an adequate experience in the matter.

The character of these symposia is similar and the quality equal to that which is found in any graduate medical society. Our students of the sixth year are able to properly comprehend and appreciate a full discussion on any of the ordinary topics. They seem anxious, moreover, to learn what has been the progress of recent date which is as yet not recorded in their textbooks. In other words, by the end of the year the student has been able to attend a series of conferences which have fairly well covered the important studies on a given number of diseases. I know of no better method to maintain his interest in the laboratory departments during the time when he is deeply concerned in clinical problems.

DISCUSSION

DR G. CANBY ROBINSON, Nashville, Tenn.: The correlation of pathology and clinical medicine is one that is of great importance and, if possible, should be begun in our usual four-year courses at the time the student is having his pathology.

I have attempted, and I think with some degree of success, to give elementary clinics to second year students at the time they are taking their pathology and attempting to show in these clinics the same subjects that the pathologist is bringing before his class. I am sure that this does a great deal in stimulating interest in pathologic processes. The teaching of pathology may be enlivened by certain clinical exercises, if these are carried out with the primary purpose of broadening the student's knowledge of the pathological problems they are studying at that time.

In regard to the pathologic conference for the students in the third and fourth year classes, it is valuable, I am sure, to present all the clinical data that have been collected in the study of the patients during life and then follow this with as full a discussion as possible before the pathologic specimens are revealed.

I think that this method is valuable from the point of view of diagnosis, not only in bringing out the correctness and the importance of collecting all available data, but also in bringing out the difficulties of diagnosis and showing that there are certain instances when all data will not lead us to the correct conclusions.

I attended a conference as a visitor a few years ago where the students were called on to make a diagnosis on the data submitted. This was criticized by another student and the whole matter pretty thoroughly thrashed out before the pathologist took the floor. I felt it was a very valuable exercise. Certainly the importance of such a conference is great in keeping the students' minds centered as far as it can be done on pathological processes underlying disease that he sees in patients.

DR. OSKAR KLOTZ, Toronto: This type of conference which I described was in no way to supplant the cooperation between the departments in the general teaching during the final years. It was rather a type of conference which added the other department to it to elucidate the points which are not often put before the student in correlation.

THE IRREGULAR STUDENT IN THE MEDICAL SCHOOL

B. C. H. HARVEY

University of Chicago

In the Medical Courses of the University of Chicago, irregularity has been due to three causes, illness, special study and gainful outside work for self-support.

Irregularities due to illness need not be considered.

The irregularity due to special study is happily increasing in frequency and importance. The better preparation of our students has given us larger numbers who are capable of special study. The more thorough organization of medical schools in closer association with universities has given our students more contacts with investigators, has suggested to them special lines of interesting and promising work and has given them facilities and opportunities of doing it. We are all interested in encouraging such tendencies and in helping inspired students to follow up their interests. As a result of such work last year sixteen of our students were given the degree of Master of Science and sixteen were given the degree of Doctor of Philosophy in the so-called medical sciences. They had become irregular in their progress towards the M. D. degree, waited over for special study and carried it far enough to attain these degrees. About fifty others had done special work of lesser amount. Of 209 students who went into the clinical work of the third year during 1924 and 1925, 143 had done more than the required minimum of work, and the average amount of extra work per student was 2 majors, that is, an excess of 11 per cent. Nearly all these Masters of Science and Doctors of Philosophy will finish the medical course, though some will devote their lives to special work in anatomy, physiology, biochemistry, public health, or some such lines of medical science. Whether they finish the medical curriculum or not, these students are likely to contribute to the progress of medi-

cal science by the special knowledge and intellectual power which they develop, and by the spirit which spreads from them.

The quarterly system, established when the university was founded, has given a considerable freedom to adjust the programs of irregular students and to encourage inclinations toward special work. I hope we may be able to use our opportunities better in the future than in the past and by increasing the freedom of elective work progress toward the best interest of the student and of Medical Science.

The irregularities due to gainful outside work for self-support appear in a large heterogeneous group of students which gives us some anxiety. The study of medicine is so great and exacting an undertaking that it may well absorb all the physical and mental energies any student can bring to it, but the conditions under which many students undertake it make outside work a necessity. Some facts in our institution are as follows:

In the preclinical courses last year ninety-seven did no outside work; ninety-one did gainful outside work. Did their study of medicine suffer? Judged by scholastic grades it did, but not much. The grade point average for those not working was 3.54; for those working 3.37. Among those working, some (54) earned more than a quarter of their expenses; their average was 3.21. Thirty-seven earned less than a quarter of their expenses; their average was 3.58. This group whose members did a small amount of outside work had the highest scholastic standing of any group.

In a preceding year (1922) forty-nine students did no outside work; 135 did gainful outside work. Did the medical work of these 135 suffer? Judged by comparative scholastic grades, it did not. The grade point average for those not working was 3.35; for those working it was 3.51. Twenty-seven students earned all of their expenses. Their grade point average was 3.48. Of these twenty-seven nine were teachers of preclinical science, and they were among the best. Their grade point average was 4.21. Their work did not injure their study of medicine. Evidently the character of the outside work is of more significance than the amount of it.

The effect of outside work on scholastic standing was viewed also from another angle. The poor students whose scholastic

record was bad enough to draw the Dean's attention came from the group who were also financially poor and doing outside work in the proportion of 3 to 1.

It is of interest to note that in the College of Arts, Literature and Science of the University, where information concerning 1,559 students was available, those gainfully employed attained a higher scholastic average than those who did no outside work. Almost two-thirds of the men and more than one-third of the women in attendance were earning a part or all of their way through college.

The history of successful physicians should give us information of value in this study.

Appointment on the faculty of Rush Medical College is some evidence of success in the study of medical science. I have inquired of each member whether or not he was engaged while a medical student in gainful outside work for self-support. Of the junior members of the faculty (those below the rank of assistant professor), sixty-two worked outside while students; forty-two did not; of the seniors (professorial members), thirty did such outside work while students; forty-one did not. Although conditions in the medical schools of a generation ago were probably less exacting than in those of today, it is interesting to note that the majority of those students who progressed in the after years to the greatest success were those who did no work outside, but who were free to give all their energies to the study of medicine.

There is, however, a large minority in the professional ranks who have worked their way from the beginning. Some of these have given the most distinguished service. They have been inspiring teachers, great physicians and devoted workers for the best in medicine. They surmounted obstacles, and the effort gave them strength and some at least were not prevented from becoming great men. But they are a minority. Even though the best group of students were those gainfully employed and even though most of the younger men on the faculty were those who worked outside while students, the majority in the higher ranks did not do such work. This shows clearly that outside work has prevented many from achieving the greatest success, but that is not incompatible with a considerable measure of success.

As a result of this study the following conclusions seem to be justified:

1. The case of each student whose work is irregular must be considered individually.

2. The irregularity that is due to special interest in some field and to special study and investigation in it should be encouraged. This is an attitude of mind which is precious for medical science. Such students should be encouraged to work where they want to and when they want to, and still find it possible to complete the medical course somehow. Requirements should be adjusted to their desire to do special work, and their tentative efforts to do it should have precedence over anyone's desire that they arrive on schedule time at any way station, even the one marked by the M. D. degree.

3. The irregularity due to gainful outside occupation injures the medical development of some of the best students, and some of the best are engaged in it. Students seem to be of three classes. Some are pathetically incapable of studying medicine and doing outside work at the same time. In considering these we may well keep in mind the statement of Billroth concerning the impecunious medical students in Vienna. The effort "to transform stupid, ignorant, starving students into stupid, ignorant, starving physicians" is not worth while. There are many steady, sound, matter-of-fact, serviceable people, for whom outside work is not always harmful. They may be better for it. They may become more sympathetic physicians, of sterner human quality. But there is a third class of students. They are fewer in number but of brighter promise, namely those few who develop a great serious purpose and who devote their lives to its pursuit.

A narrow line divides the students in these last two classes—the good and the inspired, and students often step over into the inspired group. They are lead across by a vision which they have seen, and it is just these clear-sighted ones who may be hurt by outside work. They may never see the vision if they are looking another way. If we can pick out those who might see it, we should give them their chance. We should prevent the tragedy by which they give in exchange for a pitiful pittance their precious hours, their opportunity of the "free intellectual play of free

minds," and their chance of the inspiration that might lead them to the noblest work and greatest usefulness.

It seems clear that one of the greatest services we can give is in detecting early students showing any promise of intellectual power and independence, in judiciously encouraging such students financially by loans, by the award of fellowship and scholarships, by giving them assistant teaching positions or laboratory positions along the lines of their work, and by guarding them against the ambitious tendency to overload themselves with work. By reducing the amount of school work for which they register in addition to outside work, we may preserve their health, prevent the staleness that comes of prolonged and constant effort, and encourage the mental freedom that plays around work and explores the vistas it discloses.

DISCUSSION

DR IRVING S. CUTTER, Chicago: Two or three years ago I presented before this body a study on "The Cost of Medical Education to the Student." As I recall it, the figures in the ten schools which were taken practically duplicate those Dr. Harvey presented today. One thing, however, was disclosed at that time which I wonder whether he has discovered in his summary, namely, that a reasonably large number of those doing outside work do not have to do it. The result is more funds than they really need which are used for recreation, automobiles, etc.

DR. DAVID L. EDSALL, Boston: I was very much interested in what Dr. Harvey reported. As far as the poor student is concerned, I think our figures of the number of men dependent on help for completing their course, are about like those Dr. Harvey gave for the Chicago students. There is a large group of students, in other words, in all our institutions who do need help.

I think the points he brought up about this really are the things critically to be kept in mind. It is not that the student with little or no money is a bad asset, but that there are various kinds of such students. Some of our very best men have been able to remain only through loans and scholarships, and we should have lost some of our most valuable men since I have been connected with Harvard, had they not had some means of help.

It seems to me in administering our scholarships, so-called, and funds of that kind in American universities—it is true with us and I think in other places—we have not had as clear a vision as to what they should do as they have had in some other countries. In Great Britain a scholarship means something that carries funds but it also

demands scholarship. A man can't get it just because he is poor. They give a scholarship for performance, not for poverty.

Officials told me there that no highly able, industrious boy in Great Britain—and not in medicine alone, but also in other things—need fear he could not get a good secondary school and university education. There are enough scholarships to carry the boys of superior ability and they have increased them for years because they felt for that service to the nation provision for that type of student is a very important thing.

It is a striking fact that three years ago, for the first time the Board Schools beat out the old endowed schools in the number of scholarship's they got at Oxford and Cambridge. In other words, the schools for the poor boy are now preparing boys for that type of work and carrying them into the universities in numbers on scholarships. We need to help especially the poor student of special individuality.

We have a limited amount of loan funds and a fair number of scholarships. I have found in recent years that funds had been given to the school for the establishment of small, so-called research fellowships, with such wording that they could be used for undergraduates, having previously been used only for graduates. I have permission to use them, and have been using them for undergraduate students. There are five of these yielding from \$375 up to \$475 each, and a larger one that yields \$1100 a year that can be used in the same way.

During the past year another sum yielding \$1300 has been given for American or foreign study in which it is specifically stated that it can be used not only for graduates, but also for advanced medical students.

Gradually we are increasing the number of these things. This year the corporation has given me permission to use some of the ordinary school funds for small research fellowships for those who are having difficulty on the financial side, but whose performance is such that they look like valuable material. We have four men working on these getting for time spent on research training what corresponds to the cost of their tuition; instead of being obliged to go out and do work disadvantageous to them, they can now spend time in investigation under supervision of an instructor.

Conditions are far from what they might be yet. I do not think there is any much more valuable method of spending money than upon the best or the "irregular" students. Most of the money spent in "scholarships" has been given out because the men were poor rather than because they were scholars. That is not really advantageous to the men if they are poor students any more than it is advantageous to them to carry on lame ducks from year to year.

If a student is mentally unsuited to the work, he is quite as unsuited if he is poor as if he is not poor, and we ought not to encourage

him. But the type that is mentally superior, the other type of irregular poor student, the man who wants to do advanced things, we have been trying to encourage.

We have a sort of substitute for the quarterly system in that we allow men to get credit for work in the summer when taken with us or elsewhere, if the administrative board approves of it as being of a quality comparable to the work in the regular medical course. Many men do that, some between the second and third, mostly between third and fourth years.

That means that during the summer the great majority of our class between third and fourth years do some anticipatory work which frees some of the time in the fourth year so that they have that extra time for elective work.

In addition to that we have an arrangement now that not more than fifteen per cent of the fourth year class may be given entire free election if they have anticipated enough to meet the legal requirements. That has awakened interest in a greater intellectual freedom, and this year we have the full fifteen per cent at work on free election in the fourth year. Out of those men some highly promising students have come to light, who would have been lost sight of entirely otherwise, who would have gone along in the pack and not been discovered.

Recently, in making a report to the President, I noted what I think is a good indication of the influence of a freer schedule as a stimulus to scholarly work. I mean the use of the library in the medical school. Three years ago we cut out twenty-five or thirty per cent of the required schedule and encouraged the students to use this for their individual advantage. The following year the use of the books, periodicals, and pamphlets in the library jumped forty per cent more than ever before. Since that time, that is, within three years, the use of the library has increased ninety-seven per cent as compared with any previous year, and more last year than any year before.

I think these things clearly show that the more we ask students to do the superior thing, the more we will get them to do it freely. We are the people who prevent it, not the students themselves.

DR. WALTER L. NILES, New York: I have taken considerable interest in "The Poor Boy in Medicine." I have been very much interested in this admirable exposition of a knotty problem. The figures are certainly of very great significance to us all. The question of the irregular student is an important one and needs very careful individual study; that is, the individual case should be considered. The man with vision, ambition, and scientific tendencies should be encouraged in every way, financially if necessary, for he may be made into a first rate teacher eventually. Such students should have their courses so arranged that they may extend the period of medical study, and increase their range of information along special lines. In such instances the quarterly system must

work well, and although I have had no experience with it, it appeals to me as a way by which the resources of our medical school (in producing teachers and scientists) may be utilized more fully and satisfactorily than heretofore. We of the schools who have not had experience with the quarterly system should look into it more carefully. I have been very much impressed with the results obtained at the University of Chicago.

I hesitate to say anything more about the poor boy in medicine, but my feeling about the subject has not materially changed. I have given continued attention to the question, and agree entirely with the conclusions of the speaker. Of course, there are many different types of individuals to be considered and again we must individualize, but the fact remains that those boys and girls who find it necessary to undertake considerable outside work, are definitely hampered in acquiring their medical education. It is frequently the case that the ill effects do not stop there. Many such students are prevented, or at least deterred, from taking proper hospital internships, accepting resident positions and so forth, all of which are necessary to acquire a thorough training in medicine. These students further incur debts and, more or less from necessity, are very likely to be forced into gainful occupations early in their careers. For this, among other reasons, young physicians engage in insurance and industrial work, most of which is not helpful to them as scientific physicians, and is very apt to blight their careers.

It often seems to me that the critical period of a doctor's life lies in the first few years after he leaves the hospital. If he has an opportunity to really continue the study of medicine at this period he is likely to go far. If however, he is inhibited at this point, he seldom picks up, at least he stands still, while many actually retrograde.

Concerning loan funds, they are very helpful to many students but they carry a burden which is often difficult for a young physician to shake off. I have known several instances in which a debt incurred in this way has certainly hampered the scientific development of conscientious young men. Loans should not be granted or accepted without due consideration of the conditions under which they must be repaid.

At Cornell we enquire closely into the financial status of applicants, and we are inclined not to grant admission to those who do not possess a reasonable prospect of going through their course without financial embarrassment. An exceptional student or one with experience of working his way may do it very well, but many come to the larger cities without fully realizing the expense to which they will be subjected. I think it is entirely proper to enquire into an applicant's resources and consider whether he can satisfactorily carry his work, maintain his health, and proceed to a successful career under his particular circumstances.

I also feel that from the standpoint of administration, other things being equal, and this is where individualization must be made, those students who can devote their entire attention to the study of medicine are better investments. When we pause to think that we are spending anywhere from \$700 to \$1200 annually on every one of our students, it is our duty to consider what return may be reasonably expected.

DR C. SUMNER JONES, Buffalo: We have undertaken to safeguard the very limited amount of funds available to aid the irregular student, and in order that the appropriation available may be well placed, we have refused to offer first or second year students financial aid from this fund, in order that they may demonstrate their ability to carry the school burden successfully.

No assistance has been given the student who has received conditions. If he is not able to finance his first year in the school, the prospects are very meager that he will be able to finance the latter years. Consequently, in justice to the student, as well as to conserve the fund available, we decline to offer assistance, not only during the first year, but also during the second year.

If students have maintained a good standing during the first two years, and are then in need of assistance, we try to give as many as possible the necessary aid, and it seems to me that this is a perfectly fair and reasonable system, and results in the greatest good to the greatest number who prove themselves successful students.

DR GEORGE W. CORNER, Rochester, N. Y.: There are many ways of obtaining for exceptional students the special opportunities for which Doctor Harvey has so winningly appealed. The association might be interested to hear of one such opportunity which was developed in the University of California Medical School under Dr. G. H. Whipple. Every year two promising students were invited to participate in a fellowship in the department of research medicine. The fellowship was deliberately offered to the best students in the class who usually accepted it. From time to time there were other applications from members of the second year class. Before the war the stipend was \$500; this was increased after the war; it was sufficient to support the fellow without the necessity of outside work. The men worked a year or two on problems connected with the research of the department and then returned to the study of medicine. In this way a number of good students were given at least one free year without any limitations either of curriculum or of finances. The result has been favorable in all cases. Some of the men are now doing well in the laboratories, and others in practice. Almost every one has stood out above his fellow students.

DR B. C. H. HARVEY, Chicago: In answering Dr. Cutter's question as to whether many students are doing unnecessary outside work,

I can say that it has been our experience that there are in the Colleges of Arts, Literature and Science a considerable number doing outside work merely to make extra spending money. Among the medical students there are a few whom we discourage as early as we can.

There was one student working outside who explained that this work was quite unnecessary as far as any financial stringency was concerned, but was undertaken because he felt it his duty to share in the hard and unpleasant and difficult work of the world, and for that reason, he wanted to satisfy his own soul, and undertook it.

With regard to the discussion of the award of scholarships for merit alone, we have tried to emphasize the importance of that as the basis on which scholarships should be awarded, and I have asked personally one or two students given scholarships on that basis, who didn't need them, if they would not turn them back into the general fund so they could be used over again for other students who would be greatly helped by such financial aid, and the students seemed glad to respond, when they could.

With regards to the loan fund, it seems a very desirable thing to have loan funds in considerable amounts, in amounts great enough so that we could, when we found a student who would be greatly helped by such loans, give him a rather small amount, not an amount great enough to defray his entire expenses, but great enough to help, with the statement that we don't want these loans back soon. We don't want them back ever, if it is not convenient for him to pay them back. We want them back only in order to use them over again, after many years, when the student who gets the loan is quite able to pay it back, and when he wants to help another student who may be in the same predicament he is now in.

I am sorry we cannot extend the time indefinitely like that, although I don't think we have often asked for the return until it is proffered by the student. The trouble is that the good student, the student of good quality, wants to pay it back soon, and he deprives himself of the things he needs or of opportunities to go on with his work, in order to repay the loan earlier than is needed.

With regard to scholarships, which are given them outright, it is a very delightful thing to have the statement of Dr. Edsall's experience because it is so great. I wish we could all have opportunities as great as those in his possession for doing that kind of thing. In that connection we could, perhaps take advantage of any special case that presents itself in which a student of special quality could be specially helped right now if funds were available as scholarship or loan, by going while that specific instance adds force to the appeal, to some of the people of the community and presenting the case and, on the strength of it, we could perhaps secure from them gifts that would enable us to help the poor but promising student in the school.

USE AND ABUSE OF NOTES AND NOTEBOOKS

W. F. R. PHILLIPS

Medical College State of South Carolina

Notes and notebooks have been so long parts of our educational machinery as to be seemingly essential integers of the mechanism.

I presume the practice of note taking and notebook making is but another evidence of the adaptation of our means to our necessities. When there were no books, or when books were rare and difficult of access, notes and notebooks formed the only, or almost the only, means of passing from person to person information and knowledge gained from oral or other sources. Notes were the essential facts and opinions stripped of so much of their common verbal connections as the occasion demanded. Thus made they served as so many basic points on which to reconstruct with more or less accuracy their originals. The endeavor at reconstruction called for intellectual effort—the endeavor was educational in a high degree. Note taking and notebook making differ today in no manner from the same procedures of the earliest times in respect to their educational result. As a method of impressing the mind there can be no question; the only question that can be raised pertains to the educational value of note making compared to other methods, or to whether the practice of note making is subject to improvement.

As already alluded to, note making was a necessity when published books were not accessible or accessible at great cost of money and time, either or both. Note making was obviously a substitute for books, that is, for the want of books. Necessities bring about habits and habits persist when the necessities that gave rise to them no longer exist. Being largely creatures of habit we seldom trouble ourselves to examine into the necessities of our habits so long as they bring no pressing inconveniences in their train.

Conditions pertaining to books having so changed that books

of all sorts are to be had and are accessible to every one having occasion for them, is it not time to inquire regarding the matter of note taking and notebook making as a pedagogic procedure? To ask if the procedure is now justified by its results, or if it is susceptible of improvement, or if it might not be abandoned for something better and more adapted to present conditions? In other words, to ask if the same educational result may not be had in less time and maybe with less expenditure of energy and labor.

From the standpoint of medical teaching notes will fall under two sorts: (*a*) Notes on lectures; (*b*) notes on laboratory or clinical work. It is evident that the consideration of notes on anything involves the consideration of the thing itself, of its place, relations and purposes in the scheme. In considering notes on lectures, we must consider the function of the lecture in the educational scheme; so also the laboratory and the clinic.

With the exception of graduate work, I believe it is generally admitted that the didactic lecture as the pedagogic center of an educational system is today an anachronism, an atavistic vestige. Its justification for persisting is solely that it serves to emphasize the printed book—to put, as it were, in distinguishing type the more and the less important matters of the text. Perhaps, also, by its appeal through the ear to impress the memory through another avenue of approach.

Note taking on lectures or other oral discourses is an art in itself,—one that requires long practice and considerable familiarity with the subject of the discourse. The average medical student cannot take notes and at the same time follow the theme of the lecture satisfactorily. The best that he can do intelligently is to make headings or catch-words and then subsequently, in consultation with either the lecturer or his textbooks, or both, reconstruct so much of the subject matter as deemed essential. It is certainly not worth while to take notes on a lecture unless the notes be subsequently written out more extendedly. Is it worth while to so write them out? Would not the same time spent in thoughtful study of the subject in some accepted texts be more profitable? Some years ago Professor Higbee of Iowa reported the results of some experiments conducted with classes in de-

scriptive geometry that justify an affirmative answer to this question.

Unlike notes on lectures, notes on laboratory work and on clinical work furnish data that place the student in position to find out things for himself, to learn at first hand and independently of any other authority than his own powers of observation and reasoning. What one finds out for oneself is more likely to be retained in memory and more intelligently employed, where germane to the purpose, than like knowledge acquired from the experience of others. But laboratory notes and clinical notes are, like lecture notes, worthless unless worked out. They are even more worthless unworked out than lecture notes because they represent a greater expenditure of time in the process of their making. Properly worked out laboratory and clinical notes furnish the potential means for the student to find out everything for himself, as already stated. Virtually, because of the elements of time and expense, they can serve this purpose in a restricted degree only; their larger use can be to illustrate the methods by which our knowledge has slowly been accumulated and proved during the ages. Would we not be conserving time and labor without sacrificing intellectual training, if we planned, so far as practicable, our laboratory work to serve this larger purpose and left the further assimilation of the great mass of knowledge to be acquired from our accepted texts and literature?

It has seemed to me that our present tendency is to overload the laboratory, to multiply work and experiments without regard to the intrinsic merit or purpose of the facts demonstrated or ascertained. If the truth of a proposition can be established by one experiment, is its truth any better established because it can be demonstrated by other experiments? Is it not possible that many different experiments to establish the validity of a proposition may end in befogging the clearness of all? May not the fable of the cat and her one way and the fox and his hundred ways of escaping the hounds and the result be of application to our **present** tendencies?

What has been said of the laboratory may also be said of the clinic. We are generally agreed that our curriculum is overcrowded—that we are not giving the student time to think. Is it not possible that some of this overcrowding may come from too

much laboratory work, or work incident to the laboratory method? Nearly all laboratory work entails note taking and notebook making if it is to be worth while. Working out notes takes time and it should take thought. But if we give too much laboratory work we are bound to lose one or the other, and usually we lose the other thought especially if the notebook becomes part of the student's record.

Should the notebook be a part of the student's record? Should it be marked and graded? Should it be obligatory at all? Personally, I shall answer all three questions in the negative. But because I answer negatively does not imply that I place no value on notes and notebooks. On the contrary, I value them highly, and I do my best to explain the use and value of notebooks to students. But for some time I have ceased considering notebooks in connection with the student's record—ceased considering them as evidence of knowledge. Much better evidence is obtainable by direct examination of the student in person. I have come to regard the obligatory notebook as the greatest abuse to which the notebook is subject. I have reached this conclusion slowly, and I often wonder why it took me so long to arrive at it.

The fact that convinced me finally was one that had been outstanding from the very beginning; and that fact was that the student did not make any use of his notebook in his subsequent career. Once clear of the subject by examination, if he wanted information on the subject he went to his textbooks instead of his notebooks. Of course, there were exceptions; but the exceptions were few. I have taken occasion to inquire as to student practice in subjects other than those coming within my special sphere. I find the same practice prevails generally in these other subjects. The reason given is the same in almost all cases and in substance is, that the student finds everything in his text—or reference books, and feels surer of the facts and conclusions in them than of those of his own notes.

Note taking and write-up notes is a method of impressing a subject on the mind. Studying a given text and reciting thereon is a method of impressing a subject on the mind. Given these two methods, the same subject and the same time, which will be the more effective? Is the intellectual process of writing more definite, accurate and lasting in its results than the intellectual process

of reading and rereading? Is an hour spent writing on a subject or an hour spent reading on the same subject more instructive? Which improves the memory more? Bacon has said that "if a man write little he need have a good memory" and "if a man read little he need have much cunning to seem to know what he doth not."

DISCUSSION

DR. W. H. MACCRACKEN, Detroit: We ought not to overlook the fact that not all notes are alike. Some students work advantageously in one way and some in another. I am inclined to think there are many students who believe the formal making of elaborate notebooks is an awful waste of time. There are other students who can learn better and memorize better by using this method than they can in any other way.

Some students are ear-minded and acquire information to better advantage and more readily from a didactic lecture than from a chapter in the text book covering the same amount of material, and I do not believe it possible that we should be able to say that a notebook is a good thing or a bad thing unless we take into consideration the type of man who is producing the notebook.

DR. HUGH CABOT: Do you think we are justified in requiring it?

DR. MACCRACKEN: No.

DR. WM. KEILLER, Galveston, Texas: I believe that is a problem for the individual student. I always took notes of every lecture that I attended and every book that I read, for the reason that it was the only way I could keep awake.

DR. WILLIAM DARRACH, New York: It seemed to me that if notes on lectures could be duplicated in textbooks, this rather condemned those lectures. Any lecture which can be found in a textbook had better not be given, but the student be told to read the textbook instead of listening to the lectures. Notes have been useful to me on lectures that I have heard. The other type of notes, I think, are absolutely assential. I think the idea of doing laboratory work without taking careful notes which are worked up afterward, leads us into that careless attitude which the older type of clinician had of relying purely on his memory for the statistical results of, for example, a series of operations. I think if notebooks are to be no longer used, then we should condemn also all clinical records, which I don't think any of us would do, but I think the taking of notes on information that is given to us which can be gotten elsewhere is idleness. I do not think that notebooks ought to be required except in laboratory courses. They should be required there.

DR. HUGH CABOT, Ann Arbor, Mich.: Dr. Darrach makes a very sharp division. I can recall courses that depended almost entirely on the notes taken in the course, the didactic lecturer being supported in his course of didactic lectures by the notebooks which the students are supposed to have. What happens? The student who can not keep up with the lecturer makes some staggering blunder in the notebook, reproduces it in the examination, and gets it in the neck. If we are going to require them to take notes, we must see that they get them correctly. I have seen this thing happen. A very brilliant student took his notes in shorthand and he was looked upon as being an absolute authority on the facts. He made some staggering blunder in his notes and everybody went down with a crash because they got the information from him and relied upon him for it.

I am inclined to think that the notebook in the lecture course tends to support the lectures and perpetuate them far beyond their requirements. I believe that there are still in this country, evidence to the contrary notwithstanding, some courses of lectures given which have not varied importantly for a decade, and which could be reduced to print at a very low rate. The university could well have given "leave to print" and use them as a textbook and get them right, at least insofar as the lecturer himself was right. Then the students would all get the same line to start with. The didactic lecture habit is being perpetuated to some extent by note-taking. I am very doubtful about it.

DR. DAVID L. EDSALL, Boston: May I ask if any of the members of the Association have made any experiments in regard to another point Dr. Phillips brought up, not directly to do with notebooks? That is simplification of laboratory courses as against elaboration of them.

Laboratory work has increased and multiplied in bulk. In the beginning the laboratory was used as a method of illumination rather than exposition, but it has become in this country a method of exposition of the whole subject providing illumination of conceptions gained from reading.

There are various opportunities for such experiment and I am interested to know if any have made any. I mentioned last year an experiment that Dr. Redfield carried out in the physiological course which was very suggestive, taking a group of students and instead of giving them a large number of experiences in the physiological laboratory, having half a dozen laboratory observations and studying those with great care and doing much reading and discussion on them. He is convinced and the students are convinced that they got certainly as much, perhaps more out of that than out of the regular course. This is a form of tracking experiment, which, it seems to me, this Association might in various ways carry out and if the

Federation of State Boards permits it, there would be a great deal of freedom in doing it.

PRESIDENT CABOT: Can anyone answer that question? Is there any evidence at present available?

DR. EDSALL: That is whether they are experimenting as to the reduction rather than the increase of laboratory work.

There was no reply.

DR W. F. R. PHILLIPS, Charleston, S. C.: I wish to answer the statement that there are no two students alike. I realize that there are no two students alike and that seems to me the very argument for breaking away from an obligatory rule. One student learns by the eye and another by the ear. Do not try to make both learn by the eye or both by the ear. We should remember about yoking the ox and the ass together. Let's have them yoked together properly, and not require of every student the same thing; let's break away from the routine of trying to pass everybody through the same emplate, building them up with interchangeable parts like a Ford machine.

I fully agree that laboratory notes furnish the very best means of learning, but my observation has been that the student does not work up his laboratory notes. He goes to the textbook and copies them out. Instead of thinking them out for himself, he finds them already thought out in the textbooks or laboratory manuals and spends hours of writing and writing and writing, with no thinking. That is my criticism of the laboratory notebook and I think it is a just criticism and one to which we ought to pay attention.

I have heard students say, "I have got to spend all day tomorrow writing up my notes on this or that laboratory experiment." That meant going through the textbook and copying page after page. They performed an experiment and knew it was described in their textbooks or manuals. They did not think about it, but went to their books and copied it out, and were probably graded on the accuracy of the copy. Did such students learn anything. They did not. They would better have spent the same time reading their textbooks and thinking over what they read than going through the mechanical work of copying it into notebooks.

Dr. Edsall made plain one of the thoughts I had in mind. It is much better that the student do a few experiments properly—noting correctly everything he does and thinking and reasoning out his own conclusions than that he should do many experiments and not have time to draw his own conclusions from his own work. Life is too short for us to do everything. Let us verify only such as may be necessary to understand the procedures used in establishing that which we teach as the accepted state of knowledge. A few well selected experiments will do this—the rest can be left to be read about.

There is too much time spent in the unnecessary laboratory work. I think it is a very just criticism of our methods to say the tendency is for every teacher of laboratory subjects to crowd in more and more experimental work regardless of the merit of the work and whether we were getting anything out of it.

VALUE OF THE SEMINAR IN MEDICINE

G. CANBY ROBINSON

Vanderbilt University Medical Department

The seminar is an educational mechanism developed particularly in graduate schools and I have no doubt there are many ways of conducting it.

My idea of the seminar is that it is a gathering of graduate students interested in a particular field with the professor or one of the senior members of the department as the chairman but with the students participating in a rather informal discussion.

The seminar is usually built up about a topic which is assigned to the student who acts as the leader. Now, in that sense, I know very little about it and have had no definite experience. I feel, however, that we are, particularly in clinical teaching, approaching the seminar method when we divide classes into smaller groups, when we introduce the preceptorial or advisory system, and when we attempt to teach by discussion.

As a student, I look back with a great deal of pleasure, and to the value of the evenings that we used to have at Dr. Osler's house. He devoted his Saturday evenings all through the year to the group of students that were at that time on the medical wards, and it was one of the most valuable and telling experiences in my own medical education. We would sit around the dining room table and he would discuss for the first part of the evening various topics on the history of medicine, and then take each man in turn and give him an opportunity of bringing out any points of special interest that had come up during the week or any problems that were particularly on his mind. It was a very delightful seminar, conducted in a way so that all the students of the group participated.

It is, of course, necessary for the seminar method to have small informal groups, and certain important educational functions can be carried on in these groups which cannot be carried on in larger gatherings. For instance, I am sure many of the students in clinical medicine carry with them confused or hazy

conceptions, and it is necessary that those conceptions should be cleared up.

Dr. Cutter spoke of this problem in his talk on the quiz, but I am sure that it can be better done with small groups and more informal discussions.

The question of bringing the literature before students is a problem. We have such an enormous amount of literature we want our students to know of and we want them to learn how to use original material. The students may be assigned original material and then, at the seminar, each student may have his turn to report on that part of the literature that has been assigned to him. We have attempted this in an informal way and I believe that it can be carried out more formally, perhaps, at least in a more orderly way, if the seminar method is introduced.

There are other ways in which the seminar spirit can be given to students. One is the value, or the use, of the journal club. I feel that the journal club, either of a department or of a combination of departments, is of great value in promoting the broader knowledge of the literature on the staff, and it has been our custom to allow senior students particularly interested to attend a journal club if they wish to do so.

Here they hear informal and critical discussion of the literature which is certainly of great value. They may, at times, take part in this discussion.

One other idea that has come to my mind in regard to the use of the seminar is the cultivation of what seems to me to be a very important educational factor that does not show in the curriculum; namely, the factor of what I like to call auto-education. I am sure that students do educate each other very definitely, particularly if they are given an opportunity of meeting together informally and have an opportunity of arguing and discussing various parts of their work.

The seminar could be used to cultivate this very thing. It could be used to encourage an informal spirited discussion among the students regarding various features of their work that they have had an opportunity of seeing together and an opportunity of giving them a certain amount of intellectual rivalry.

I remember there was a group of us, as students, who used to argue and then we would make small bets. It was a very pleas-

ant form of gambling and often made us seek the answer in a very accurate way, and I am sure that such discussions may be stimulated in a seminar where there is some one to lead the discussion and, perhaps, decide to whom the money belongs.

The whole problem of selection of material in clinical medicine is one of great difficulty and we can in no sense, of course, cover the field, but we should encourage thinking and we should encourage an exchange of ideas and I believe the seminar method, where there are small groups of students and where the leadership is stimulating and accurate, may prove of very definite value.

DISCUSSION

DR. STEPHEN RUSHMORE, Boston: I have had very little experience with the seminar in medicine, but one point made which I think is very important is the auto-education in which the conference method plays an important part.

As a rule, students do not know how to take part in a conference either by way of contributing to the general value of the conference or in getting much from it for themselves. Hence, it is a very important educational method that conferences should be utilized for this purpose.

I noticed recently that in the University of Kentucky a course in conferences has been developed, and it seems to me that such a course should be of extreme value.

I recall the conferences to which Dr. Robinson refers, as being one of the most important and valuable parts of our medical education, but the opportunity to come close to such a great teacher as Dr. Osler, is, of course, unusual.

DR. N. P. COLWELL, Chicago: In my trips among medical schools, I can almost pick out those in which seminar courses are offered, by the greater use being made of the library. In some schools I find a well-equipped library with a large number of valuable medical periodicals, and yet, on inquiry, I am surprised to find that its use is very limited, if indeed, it is used at all. Would it not be excellent for all schools, therefore, to provide optional seminar courses, if for no other purpose than to stimulate a larger use of the valuable material in medical libraries?

DR. ROBERT WILSON, Charleston, S. C.: I have been employing the seminar method with my senior class for some years. We call it a conference, but it amounts to a seminar, and is conducted in some respects along the lines Dr. Robinson has mentioned. We meet weekly. Our classes are not as large as in some institutions so that

I am able to have the whole senior class meet me once a week. An effort is made to stimulate free discussions. The students bring to the conference or seminar problems which they have met in the ward, or which they have encountered in their reading, and thrash them out. We often get an active and stimulating discussion. My experience is that these conferences are of very great value.

Some of the work of the seminar is carried on by the students in their societies, of which we have two. These societies meet biweekly and cases are discussed and papers read.

DR. HAROLD RYPINS, Albany, N. Y.; I had some experience with a medical seminar at the University of Minnesota, which brings out some features not mentioned. It was originally started with the departments of physiology, pharmacology and physiological chemistry, and was open to graduate and senior students who cared to come. Attendance was voluntary.

Very soon we had professors from the departments of biology, botany, agriculture, physics and many clinicians were coming in, so the seminar became one place in the university where all the men interested in scientific problems at large came together and exchanged ideas.

It was amazing to find the men we had looked up to as great scientists in physics take the simplest problems in medicine and look at them with wide open eyes, and we were equally astonished because what they thought were simple things in physics and agriculture and chemistry, we did not know.

It was a great ground for common discussion. It was real university life, and though it was tough sledding for the senior students, it did not hurt them a bit. They became aware of the fact that none of us knew very much, and got over their shyness. They would read up articles and discuss them and get the opinions of agriculturists, chemists, physiologists, botanists and clinicians. It brought the whole scientific body of the university together once a week.

I think it was the best possible graduate teaching in medical science.

DR. CLYDE BROOKS, University, Ala.: The seminar method has been of great value to us in the University of Alabama. We also used the same method in Ohio. We are rather formal about it. On the campus of the University of Alabama stands the old Gorgas home. Dr. Gorgas was born in this home. We have now a new library building, the Gorgas Memorial Library. The old Gorgas oak which stands just in front of the Gorgas home is bigger in diameter than one of these columns (indicating). So very naturally, when we organized the sophomores into a scientific society, they called themselves the "Gorgas Medical Society."

This Society holds seminars on various questions. The first one

is usually on the "Origin of the Heart Beat." They get up a formal program and read the original literature and prepare addresses, and then, after that, they have informal arguments. They use this same method all through the course in physiology and in pathology.

One afternoon a week is devoted entirely to the library and the instructor goes into the library to work with the students in working out the literature and all the members of the class study the subject to be prepared for discussion. We have found it makes all the difference in the world whether a student is encouraged to go into the original literature or not. It seems that if he does not ever go into it, he remains unsophisticated. He does not understand sources and foundations on which we base our knowledge; but, if he once gets a taste for looking up a subject thoroughly in the library, then he understands what it all means.

I might say that Dr. Colwell was down and inspected us the other day, and that he made the same points there he made here today. He went into the library and did not see any one, and smiled a delicate smile. He made good work of it; but I had to remind him that this was on last Friday and all students were going to the Alabama-Georgia Tech football game. So the library was empty.

I think we are very much indebted to Dr. Robinson for his suggestion here about the seminar.

DR. G. CANBY ROBINSON: I am glad that there seems to be an interest in the seminar method of teaching.

ATTENDANCE ON CITY'S SICK POOR AS PART OF CLINICAL INSTRUCTION

WM. H. GOODRICH

University of Georgia Medical Department

I think it is a little premature to discuss this subject. To discuss a subject practically in its inception is frequently a dangerous thing to do. Our visualization of the subject at this period seems to impress us with its better features and to minimize the defects.

At the Chicago meeting of the Association, Dr. Flexner made the remark that he had met a great many medical men and that it was quite surprising to find how readily medical men yield to the temptation of putting sometimes an imaginary best face on what they were actually doing or had done. I fear that in discussing a new project, it may appear that there is a little bit too much enthusiasm for this project and, if so, you may put it down to the fact that our profession, as a whole, is apt to suffer from this particular way of looking at things.

I think it may be assumed, almost as an axiomatic corollary, that to teach students well, to teach them properly, and to study diseases, a medical school must have practically complete control of patients. Our school is particularly fortunate in that it has complete control of the patients in the hospital wards and practically complete control of the patients in the outpatient department and of the sick poor in their homes.

We use the outpatient department for teaching purposes and as a feeder for the wards of the hospital. The sick poor are under the care of so-called city physicians, and these city physicians are under the control and appointment of the school.

We have considered for a number of years the possibility of utilizing the field of activity of the city physician for teaching purposes, realizing that additional clinical facilities would be obtained and realizing that the scope and possibilities of this new departure were considerable.

A tentative program arranged for this session has now been in operation six weeks. Apparently, it is working satisfactorily and is meeting with the unqualified endorsement and enthusiasm of the students. The fourth year students are divided into three sections, each section rotating every eleven weeks, that is, a medical, a surgical and a specialty group.

The medical and surgical sections work in the afternoon in the outpatient department, while the specialty section visits the sick poor in their homes. A clerk in the hospital receives all calls from the sick poor, and notifies the particular city physician from whose district the call comes. The city physician visits this patient and examines him, offers some form of treatment and then advises that he will send out a young physician who will examine him further. He explains the importance of further investigation, together with the great advantage and necessity to the patient of a complete physical examination, a history and laboratory tests.

The students are sent out in rotation. They visit the patient at his home, make a careful physical examination, take the history, and collect specimens of blood, sputum, urine, etc.; come back to the hospital, complete their laboratory tests and file their record. A special room has been set apart in the hospital as a record room for this purpose, and for conferences.

In most instances the student is largely left to his own initiative in these cases. He visits the patient daily, but he is carefully checked and supervised in his work. Two city physicians were elected last June for a period of one year. They are two of our graduates who have served two years in the hospital as interns. These two men, each morning, go to this record or conference room, review and criticize the work that has been done by the students and write out any criticism or suggestions as to further investigation or management, on a small slip and attach it to the record.

In most cases the student is allowed to continue the handling of the case to its natural termination. If a case does not progress well, or if there is any doubt as to the diagnosis, the instructor again visits the patient in consultation with the student.

In the event of very serious illness, either the patient is brought into the hospital, or a consultation of the head of the department,

the instructor, or city physician, and the student is arranged for at the patient's home.

There is no question as to the value of the outpatient department so far as the education of the student is concerned. In some respects it has advantages over ward teaching. So far as the onset of the symptoms is concerned, we know that cases are seen, as a rule, much earlier in the dispensary than in the hospital, and the student really has no opportunity to study these early symptoms of disease except in the outpatient department.

We feel that this new departure, if it can be carried on successfully, gives the student not only an opportunity for studying disease in its beginning, but it also offers the student an opportunity to learn something of the environment of the patient, something of the economic and social aspects of the case, which means so much in rounding him out as a general practitioner.

We must realize that the output of the average medical school is not a finished product. The recent graduate is acutely conscious of this and he feels that he lacks something which his previous clinical training and teaching did not give him. He feels that he is not prepared to take up his career as a general practitioner immediately and confidently.

This is largely due to the fact that the little ailment, the ordinary disorders, are stressed but little in teaching in the average medical school. A great deal is said about obscure disease, a great deal of stress is laid upon diagnosis and pathology, but the handling or the complete management of cases, is, as a rule, rather lightly passed over.

We hope, in this new method of training, to acquaint the student with some of the fundamental procedures which he will need to know shortly after beginning his career. We feel that he will become familiar with the ordinary maladies that he will later be confronted with as a general practitioner. We feel that he will be shown the social setting of the patient, and will realize early the effect of environment upon his patient, and with this training that he will be given a substantial background that may mean much to him in the early years of his practice.

Whether or not the old family physician will ever come back is a question which only the future can answer, but the fact remains that our schools are graduating each year a large number

of men, 80 per cent of whom are beginning careers as general practitioners, and we owe it to them and to the community to make them as nearly a finished product as we can.

DISCUSSION

DR. H. C. TINKHAM, Burlington, Vt.: About ten years ago we organized this service in Burlington. I suggested to the City Council that if they would turn over to the university the small amount they were then appropriating for the services of a city physician, the university would take over the care of the city poor and guarantee to give better service, or at least as good service, as they were then having. I succeeded in getting this appropriation. I think it amounted to \$600 or \$700 a year. The position of city physician was abolished excepting insofar as I occupied that position as dean of the College of Medicine. We established the city dispensary, which the university owns, administers, and for which it pays the bills.

The men connected with the dispensary are all university instructors. The dispensary has a fairly well organized service for a small town. The city poor and the poor farm are taken care of by this service. The poor who need medical service in their own homes are also cared for by this service. The city poor who are ambulatory come to the dispensary.

Any clinician connected with the University of Vermont is available for consultation work in connection with the city poor in any department. The director of the dispensary has charge, and any poor patient in the city can command the consultation services of any clinician connected with the university. I believe the poor people of Burlington have as good, if not better medical or surgical service, as the people who are able to pay for it. The service has been exceedingly satisfactory. There have been practically no complaints.

The relation between the dispensary and the hospital is such that all laboratory work which it is not consistent to do in the dispensary, like roentgen-ray work, is taken to the hospital. All patients who need hospital service are admitted to the hospital and cared for free of charge. All records are kept in the same way as the hospital records and are on file at the dispensary. The student service is in groups of four. They have always been under the direction of one of our men. They are never without supervision.

The whole plan has worked out well. The poor people of the city are satisfied. The university people are satisfied.

DR. HUGH CABOT: Is there any difficulty in determining who is and who is not an indigent patient?

DR. TINKHAM: That is one of the things which will always be a trouble in a charity service. We try to discourage people from

coming who are, we believe, able to pay, but I suppose our service, like every other gratuitous service, is abused and there are people who come to the dispensary and seek the service who perhaps would be able to pay a small fee. Still, I believe that in our administration of it, there is, perhaps, as little in the way of abuse as would come in ordinary dispensary service.

DR. WALTER L. NILES, New York: It seems to me that these experiments are of very great interest and may bear considerable fruit. Anything we can do to improve the technique of our students is desirable. It is probably true that a very great majority of our graduates leave us inadequately equipped to handle patients, largely because of their ignorance of the environment of patients. It seems to me that an opportunity to get some practice in the homes, such as Dr. Goodrich has described, is highly desirable. The only objection that I see is that it must take considerable time, and one would have to balance the advantages against this important disadvantage.

As to indigent patients, we have had some experience at the Cornell Clinic, which has been operated as a pay clinic during the past four years. One of the questions raised was whether or not people who might afford to pay larger fees would ask for service at the clinic. Our patients have been very carefully checked up and we have accurate information about their financial condition. We find that less than two per cent of the applicants for admission have incomes in excess of our economic standards. The average families that come to us have incomes of less than \$2400 a year and there is almost always more than one wage earner.

At the other end of the economic scale we find that more than 10 per cent of the applicants are below our economic standards; that is we do not believe they should be asked to pay for their medical service. They represent a difficult class to handle as they do not understand why they should not be given service so long as they have the price in their pockets.

I think it is evident, in New York at least, that very few people seek free medical advice when they ought to pay for it. On the other hand a majority of those who are relatively indigent want to pay for what they get.

DR. W. H. MACCRACKEN, Detroit: I would like to mention something that we tried last summer. It had become pretty evident to all of us that we were not producing young men and women trained to practical general medicine. Our students were hospitalized to the n'th power, so to speak, and the only idea they seemed to have was to get a patient into the hospital at the earliest possible moment. When they got the patient there, they would know what to do.

A patient in the home was an unknown quantity as far as the student was concerned, and we thought that was pretty bad, so we

offered an elective opportunity for such students as might wish it, (I think there were twelve who did), to get some practical experience in general medicine in the home under the members of our staff in internal medicine.

The staff in internal medicine cheerfully agreed and apparently without much difficulty succeeded in providing an adequate number of indigent patients for the training of these students. The students, in the summer, took care of these patients under the supervision of our medical staff, and were quite enthusiastic over the result of the experiment. I hope that the patients were pleased.

The question immediately arose which has already been asked here: What is an indigent patient? I certainly don't know. Detroit is an industrial city and is supposed to be the home of high wages. The average working man there earns \$6 a day and works, contrary to the general idea of things, about twenty days out of the average month, which gives him an income of about \$120 a month to maintain his family in a city of high living costs. If that isn't being indigent, I have no conception of indigence. There are very many people who are not paupers but who are quite unable to pay the cost of the services of a so-rated first-class private physician.

Many of these people were taken care of through the medium of the medical school in this way.

DR W. H. GOODRICH, Augusta, Ga.: I have little to say further, as this is relatively an untried project. Once a week the heads of medicine and surgery, the two instructors, and the group of students, meet in the conference room and a history meeting is held. This is largely for the discussion of closed or dismissed cases, but an opportunity is given for discussion of the treatment, further investigation and management of the cases then under treatment.

I think this plan would probably not work where you had a very large school. The fourth year classes in our school average from twenty-four to thirty in number, so that if the class is divided into three sections, about eight or ten will be doing this specialty work.

As mentioned, this form of training has been in operation only six weeks but having the control and the authority to do this work it is so far apparently progressing satisfactorily.

MINUTES OF THE PROCEEDINGS OF THE THIRTY-SIXTH
ANNUAL MEETING OF THE ASSOCIATION OF AMERICAN
MEDICAL COLLEGES, HELD IN CHARLESTON,
SOUTH CAROLINA, OCTOBER 26, 27 AND 28, 1925

FIRST DAY

MORNING SESSION

The thirty-sixth annual meeting of the Association of American Medical Colleges was held in Charleston, South Carolina, October 26, 27 and 28, 1925, at the Fort Sumter Hotel. The meeting was called to order by the president, Dr. Hugh Cabot, at 9:30 a. m.

Before proceeding with the regular program, the president announced that pleas had been made by several of the delegates present that they be permitted to return home for the transaction of very important business on the evening of the second day. Therefore, the Executive Council had decided that the executive session scheduled for the third day would be begun immediately after the adjournment on the afternoon of the first day, and concluded, if possible. If not concluded, a second session would be held after the adjournment on the afternoon of the second day, thus giving these delegates an opportunity to return home as requested.

The regular program was then begun. The first paper was read by Dr. Wm. Keiller, Dean of the University of Texas Department of Medicine. It was entitled, "The Claims of the Fundamental Subjects."

Dr. Charles F. Martin, dean of the Faculty of Medicine of McGill University, followed with a paper entitled, "The Relative Value of Subjects in the Medical Curriculum."

These two papers were discussed by Drs. W. F. R. Phillips, Ray Lyman Wilbur, Stephen Rushmore, C. A. Hamann, S. A. Brown and Wm. Keiller.

The next paper was read by Mr. M. R. Trabue, director Bureau of Educational Research University of North Carolina. It was entitled, "Increasing the Usefulness of Examinations."

Mr. Trabue's paper was discussed by Drs. Wm. Darrach, L. S. Schmitt, D. L. Edsall, Wm. Keiller, Frederick T. van Beuren, Jr., E. S. Ryerson, Irving S. Cutter, Hugh Cabot, W. T. Sanger, C. Sumner Jones, C. A. Hamann, C. C. Bass, W. F. R. Phillips, Ray Lyman Wilbur and Mr. Trabue.

Mr. C. E. Chadsey, dean of the College of Education of the University of Illinois, followed with a paper entitled, "Technic of Teaching as Applied to Medical Teaching."

"Impressions on Medical Teaching Gained from Ten Years Experience with National Board Examinations" was the title of the next paper contributed by Dr. J. S. Rodman, secretary of the National Board of Medical Examiners.

This paper was discussed by Dr. Wilbur S. Davison.

At this juncture Dr. Ray Lyman Wilbur asked for the privilege of the floor. His request was granted.

Dr. Wilbur said:

The Commission on Medical Education has been organized under the auspices of this Association, and with the help of individuals in the Association, the Rockefeller Foundation, the Carnegie Corporation, the American Medical Association and others. It became quite clear after discussion that it was desirable to have certain medical schools undertake experiments in the field of medical education. I was requested, as a member of a special committee, to ask the Association in an executive way to give opportunity to certain medical schools to modify the curriculum in any way they thought desirable and still not lose cast with the Association. We are also asking the same privilege from the state licensing boards. In order to get loose from the bonds which now bind institutions and hamper them, we are asking for certain rights to be given certain institutions. I shall ask for a vote on this question in the Executive Session.

An adjournment was then taken until 2 o'clock.

AFTERNOON SESSION

The meeting was reconvened at 2 o'clock by President Cabot. The first paper read was the President's Address, entitled "Should Medical Education be Importantly Recast."

This address was followed by a group of four papers dealing with teaching measures. They were:

"The Teaching of Surgery," by Dr. C. A. Hamann, dean and professor of surgery in the Western Reserve University School of Medicine.

"The Teaching of Biochemistry," by Dr. Chester J. Farmer, professor of biochemistry in the Northwestern University Medical School.

"The Teaching of Bacteriology in the Medical Curriculum," by Dr. Karl F. Meyer, professor of bacteriology in the University of California Medical School. In the absence of Dr. Meyer, this paper was read by Dr. L. S. Schmitt, acting dean of the school.

"The Teaching of Practical Clinical Laboratory Work in the Undergraduate School," by Dr. C. C. Bass, dean of the Tulane University of Louisiana School of Medicine.

These papers were discussed by Drs. Wm. Darrach, Oskar Klotz, Irving S. Cutter, Alexander C. Abbott, G. Canby Robinson and C. A. Hamann.

The meeting was then adjourned for the Executive Session.

EXECUTIVE SESSION

Pursuant to the announcement previously made, the delegates convened in executive session at 5 o'clock, Monday, October 26, with the president, Dr. Hugh Cabot, in the chair.

ROLL CALL

The roll was taken. The following colleges (57) were represented: University of Alabama School of Medicine—Clyde Brooks. College of Medical Evangelists—P. T. Magan.

- Stanford University School of Medicine—Ray Lyman Wilbur.
 University of California Medical School—L. S. Schmitt.
 McGill University Faculty of Medicine—Charles F. Martin, J. C. Simpson.
 University of Toronto Faculty of Medicine—E. S. Ryerson, Oskar Klotz.
 University of Colorado School of Medicine—Maurice H. Rees.
 Howard University School of Medicine—Collins Marshall.
 Emory University School of Medicine—Russell H. Oppenheimer.
 University of Georgia Medical Department—W. H. Goodrich.
 Loyola University School of Medicine—L. D. Moorhead, P. J. Mahan.
 Northwestern University Medical School—Irving S. Cutter, Chester J. Farmer.
 University of Chicago (Rush)—B. C. H. Harvey.
 University of Illinois College of Medicine—David J. Davis.
 University of Kansas School of Medicine—H. R. Wahl.
 University of Louisville Medical Department—Stuart Graves.
 Tulane University of Louisiana School of Medicine—C. C. Bass.
 Johns Hopkins University Medical Department—Wilbur C. Davison.
 University of Maryland School of Medicine—J. M. H. Rowland.
 Boston University School of Medicine—Alexander S. Begg.
 Medical School of Harvard University—D. L. Edsall.
 Tufts College Medical School—Stephen Rushmore.
 Detroit College of Medicine and Surgery—W. H. MacCraken.
 University of Michigan Medical School—Hugh Cabot.
 University of Mississippi School of Medicine—J. O. Crider.
 St. Louis University School of Medicine—Hugh McCulloch.
 University of Missouri School of Medicine—Guy L. Noyes.
 John A. Creighton Medical College—H. von W. Schulte.
 University of Nebraska College of Medicine—J. Jay Keegan.
 Albany Medical College—Harold Rypins.
 Columbia University College of Physicians and Surgeons—Wm. Dar-
 rach, Frederick T. van Beuren, Jr.
 Cornell University Medical College—Walter L. Niles, John A. Hart-
 well.
 Long Island College Hospital—Adam M. Miller.
 New York Post-Graduate Medical School—Wm. D. Cutter.
 Syracuse University College of Medicine—H. G. Weiskotten.
 University and Bellevue Hospital Medical College—Samuel A. Brown,
 John Wyckoff.
 University of Buffalo Department of Medicine—C. Sumner Jones.
 University of North Carolina School of Medicine—I. H. Manning.
 Wake Forest College School of Medicine—Thurman D. Kitchin.
 University of North Dakota School of Medicine—Harley E. French.
 University of Cincinnati College of Medicine—A. C. Bachmeyer.
 Western Reserve University School of Medicine—C. A. Hamann.
 Hahnemann Medical College—W. A. Pearson.
 University of Pennsylvania School of Medicine—Morton McCutcheon.
 Woman's Medical College of Pennsylvania—Martha Tracy.
 Medical College of the State of South Carolina—Robert Wilson, W. F.
 R. Phillips.
 Meharry Medical College—J. J. Muldowney.

University of Tennessee College of Medicine—O. W. Hyman.
 Vanderbilt University Medical Department—G. Canby Robinson.
 Baylor University College of Medicine—W. H. Moursund, S. P. Brooks, E. H. Cary.
 University of Texas Department of Medicine—W. H. Keiller.
 University of Utah School of Medicine—R. O. Porter.
 University of Vermont College of Medicine—H. C. Tinkham.
 Medical College of Virginia—Manfred Call, W. T. Sanger.
 University of Virginia Department of Medicine—J. C. Flippin.
 West Virginia School of Medicine—John N. Simpson.
 Marquette University School of Medicine—Eben J. Carey.

OTHERS PRESENT

The following delegates and visitors registered:

C. E. Chadsey, University of Illinois; M. R. Trabue, University of North Carolina; W. C. Rappleye, Commission on Medical Education; N. P. Colwell, Council on Medical Education and Hospitals of the American Medical Association; Harold Rypins, University of the State of New York; Everett S. Elwood and J. S. Rodman, National Board of Medical Examiners; F. W. O'Connor, Rockefeller Foundation; Paul S. McKibben University of Western Ontario; Alexander C. Abbott, University of Pennsylvania School of Public Health; Howard N. Kingsford, Dartmouth Medical School; and George W. Corner, University of Rochester School of Medicine and Dentistry.

MINUTES OF THE PREVIOUS MEETING

The minutes of the March, 1925, meeting of the Association were submitted. The secretary stated that unless it was the wish of the delegates assembled that these minutes be read, he would offer, as having been read, the minutes as published in the proceedings of that meeting, pages 165 to 191 inclusive.

On motion, duly seconded, the minutes as printed in the proceedings were adopted.

The report of the secretary-treasurer was called for and Dr. Zapffe read the following report:

REPORT OF SECRETARY-TREASURER

The last meeting of the Association was held eight months ago. By unanimous vote the time of meeting was changed from the Spring of the year to the Fall in order to fit in to better advantage with college work and to avoid the conflict with the meetings of state legislatures which often necessitated the attendance there of deans and preventing their attendance at the meetings of this Association.

It was feared by some of the representatives at the time that it would not be possible to arrange a program of interest for a meeting to be held so soon after the previous one. The program for this meeting is now a thing of the past and it is for you to judge whether it was good, bad or indifferent. The secretary wishes to express his appreciation for the whole hearted support and cooperation given him

in the preparation of this program by all those with whom he corresponded regarding contributions. To them is due credit for whatever merit it possesses. Furthermore, he regrets that many who were willing to contribute had to be disappointed because of the time element, partly, and also because some papers offered did not fit into the plan of the program. The program for the 1926 meeting will, no doubt, provide a place for all these papers.

PROCEEDINGS OF THE PREVIOUS MEETING

The proceedings of the last meeting were ready for distribution in less than sixty days after the meeting. They were distributed as in previous years to the colleges, libraries, and all organizations and persons interested in medical education. That the value of these proceedings is being appreciated in increasing degree is shown by the many requests that are received to supply back numbers to complete files, but, unfortunately, these demands cannot be met in full measure because of the lack of material. The stock has been almost exhausted. Any one who has back numbers of no use to him will confer a favor on some one if he will send such copies to the secretary. University libraries are especially anxious to secure copies, and have even offered a price for them.

MEMBERSHIP

The membership now numbers 71 medical colleges. No new applications for membership have been received since the last meeting. Two applicants, the University of Manitoba and the New York Post-graduate Medical School, who could not be inspected before the last meeting, have since been inspected. The inspection reports are in the hands of the Executive Council and will be presented to you for action later by the Council.

INSPECTIONS

Inspections of member colleges could not be made owing to circumstances arising from the closing of the schools for the summer vacation. This work will be taken up during the present school year and will be reported on at the next annual meeting.

RECODIFIED CONSTITUTION AND BY-LAWS

The Executive Council at its meeting in March appointed a committee to recodify the constitution and by-laws. The report of this committee is in your hands and will be submitted for action later. It embodies the amendment offered by the Northwestern University Medical School raising the annual dues to \$100 per year.

AMENDMENT TO INCREASE DUES

The main reason for this amendment is to provide funds to resume the publication of the Association Bulletin which during its existence proved a valuable and necessary means for communication between this office and the member colleges. Four years ago it was voted in annual meeting to resume such publication but lack of funds has made this impossible. For this reason this amendment should carry.

SURVEY OF MEDICAL EDUCATION

The Committee on Survey of Medical Education, of which Dr. Cabot is chairman, has completed the arrangements, financial and otherwise, for carrying on its work and will render a report later.

INTERN PROBLEM

The intern problem is also nearing a satisfactory solution as is shown by the report of the delegate to the American Hospital Association which will also be read later.

FUNDS

The treasurer reports that there is cash on hand at this time amounting to \$953.84.

(Signed) FRED C. ZAPFFE,
Secretary.

On motion, duly seconded, the report was accepted and the accounts referred for audit to the Auditing Committee consisting of Drs. H. G. Weiskotten and Thurman D. Kitchin.

REPORT OF THE EXECUTIVE COUNCIL

The report of the Executive Council was called for and submitted by Dr. Walter L. Niles, chairman of the Council.

The Executive Council met and considered such business as was brought before it by the secretary. As a result of our deliberations we have certain recommendations to lay before you for your consideration. First in order are the applications for membership made by the University of Manitoba Faculty of Medicine, Winnipeg, Canada, and the New York Postgraduate Medical School.

APPLICATIONS

Both these schools were inspected by the secretary, and a very full and complete report was presented to the Council. The Council recommends that the applications of both schools be accepted and that they be accorded full membership in the Association.

DUES

The Council also considered the proposed amendment to increase the dues from \$50 per year to \$100. The chief reason for this increase is, as has been mentioned by the secretary, to provide funds to resume the publication of the Bulletin of the Association.

Many of us realize that the activities of the Association are not sufficiently known even among our own faculties, and that the Bulletin which was formerly issued served to bring to the attention of faculties and other interested groups many matters that come before this Association from time to time. The Council feels that it is desirable to resume the publication of the Bulletin, perhaps quarterly as before. There are so many matters discussed here in the meetings, things which come up also between our annual meetings, which might very well be brought to the attention of executive officers of the

schools and particularly to the faculties. It will be possible to issue several thousand copies of such a small bulletin.

RECODIFIED CONSTITUTION AND BY-LAWS

The Council, therefore, recommends the increase of dues to \$100. We found that there was no other important association which has to deal with educational matters, not only in medical schools, but also in all other forms of education, in which dues were less than \$100. Our expenses, fortunately, are very, very small.

The Council also recommends that the recodified Constitution and By-Laws be adopted as printed and sent to the various medical schools. It was clearly explained in the matter sent out that there have been no changes made in either the Constitution or the By-Laws, except one. It is simply a deletion of matter which has become either obsolete or unimportant. The only change made was increasing the dues to \$100 per year as it was anticipated that that amendment would be carried at this meeting. The recodified Constitution and By-Laws brings the matter up to date and offers a more reasonable, rational working basis for the present time, and we, therefore, urge its adoption. It is appended to this report.

AMERICAN CONFERENCE ON HOSPITAL SERVICE

The next recommendation we had considerable discussion about and just a little hesitation in recommending it. It is the withdrawal from membership in the American Conference on Hospital Service. The movement was originally participated in and supported by this Association, but, as time has gone on, the Conference has not appeared to be of any benefit whatever to this organization and it is now thoroughly on its feet and we do not feel that it is necessary to make any contribution to its support. The Council, therefore, recommends withdrawal from membership in the American Conference on Hospital Service.

AMERICAN COUNCIL ON EDUCATION

The next recommendation was contingent on the passage of the amendment to increase the annual dues. The Council recommends that the Association accept membership in the American Council on Education. This is a body which is interested only in educational matters, not primarily in medical education, but, nevertheless, it is an important educational bureau and one in which an important organization like ours, dealing with an important phase of education, should participate. We, therefore, recommend that this Association accept membership in the American Council on Education. The dues are \$100 annually. This Association was a member of that Council for several years and withdrew from membership shortly after the war ended on account of financial stringency. If the Association had been more opulent, it would not have withdrawn from membership in that body. Therefore, this recommendation carries with it a renewal of membership rather than a new membership on our part.

(Signed) HUGH CABOT,
IRVING S. CUTTER,
CHARLES F. MARTIN,
FRED C. ZAPFFE,
WALTER L. NILES, Chairman.

CONSTITUTION

ARTICLE I.

NAME

This organization shall be known as the Association of American Medical Colleges.

ARTICLE II.

OBJECT

The objects of this Association shall be the betterment of medical ducation and medical teaching.

ARTICLE III.

MEMBERSHIP

SECTION 1. Any medical college conforming to the requirements of the Association as expressed in this constitution and by-laws, is eligible to membership.

SEC. 2. Any graduate school in medicine, a part of a university, any graduate division of a university offering medical instruction, or any school offering courses in medicine to general practitioners but not leading to any degree, is eligible to graduate membership in the Association on conforming to such requirements as the Association may adopt.

SEC. 3. A medical college desiring membership in this Association shall make application in writing, express its readiness to be inspected and to defray the expense of such inspection. The application must be accompanied by a remittance of \$100. The application, the inspection report and all other information bearing on the applicant for membership shall be submitted to the Executive Council for consideration. The Executive Council shall report its findings to the Association at the next annual meeting for final action. A majority vote of the accredited representatives present at such meeting is required for election to membership. If the application is accepted, the \$100 sent with it will pay the dues for the current year; if the application is rejected, the money will be returned to the applicant.

SEC. 4. Each college in active membership is entitled to one representative at all regular meetings of the Association, and to vote on all questions. The dean of the college shall be the accredited representative, unless otherwise provided by the college authorities.

SEC. 5.—DUES. The annual dues shall be \$100, payable in advance, not later than February 1. The year shall be estimated from September 1 to August 31 of the next ensuing year. Colleges in arrears after February 1 shall be dropped from membership, and can be reinstated only by making formal application to the Executive Council, and at the same time depositing with the secretary all arrearages. The power of reinstatement shall be vested in the Executive Council, subject to the approval of the Association at a regular session. If the application for reinstatement is rejected, the money deposited shall be refunded.

ARTICLE IV.

STANDARDS

SECTION 1. The Association shall have the power to establish for its membership such educational *standards, rules and regulations*, governing admission to the study of medicine, the curriculum of study, and the requirements for graduation, as it shall deem necessary for the best interests of medical education and the aims and objects of this Association.

SEC 2. The Association shall also have power to establish such other rules and regulations as may be deemed necessary to further the aims and objects of this Association.

SEC 3. All educational standards and all rules and regulations established by the Association shall be embodied in the by-laws of the Association, and shall be observed by every member of the Association. Failure to observe such by-laws shall constitute a violation of the constitution of the Association.

SEC. 4. Any school in membership in the Association which shall violate any part of the constitution and by-laws shall be subject to such *discipline or penalty* as the Association may deem fit and proper.

ARTICLE V.

ASSOCIATE AND HONORARY MEMBERS

SECTION 1. In addition to the representatives of colleges in attendance at regular meetings, who are termed *active members*, there shall also be *associate members* and *honorary members*. Associate members shall consist of former representatives. Distinguished teachers in medicine and surgery may be elected to honorary membership. Associate and honorary membership shall be conferred only by submission of the name of an eligible to the Association and a two-thirds vote of the delegates present at any annual meeting.

SEC. 2. Only duly delegated and accredited active members in actual attendance, whose annual dues are paid, shall have *voting power*, but associate, honorary and graduate members may participate in all other proceedings and may be elected to any office.

ARTICLE VI.

OFFICERS

SECTION 1. The officers of this Association shall be a *president, vice-president, secretary-treasurer* and an *executive council* of seven members, consisting of the outgoing president, the president, the secretary-treasurer and four elective members, two to be elected to serve one year, and two to be elected to serve two years, and thereafter two to be elected at each annual meeting to serve two years. All the remaining officers to be elected to serve one year or until their successors are elected.

SEC. 2. The *president* shall preside at all meetings and perform such other duties as parliamentary usage in deliberative assemblies and the by-laws of this Association may require.

SEC. 3. The *vice-president* shall preside in the absence of the president, and perform such other duties as may be prescribed by the Association.

SEC 4. The *secretary-treasurer* shall record the proceedings of the meeting of the Association, and edit and publish the same. He shall collect the dues and assessments from the members. He shall take charge of all moneys that may be received from all sources and deposit the same in a bank in the name of the Association of American Medical Colleges. He shall make the annual report of the Association and perform such other duties as may be required of him by the Association and the Executive Council.

SEC 5. The *Executive Council* shall organize after each annual meeting and elect a chairman. After such organization it shall appoint the following standing committees and representatives: 1. Education and pedagogics. 2. Representatives to other organizations, and such other committees as may be deemed necessary. The Council shall have and exercise direct supervision, general control and management of the business affairs of the Association, subject to the direction and approval of the Association. It shall have the power to fix the salaries of the officers and disburse funds for purposes pertaining to the affairs of the Association. It shall have the power to investigate any charges made against members of the Association for violation of the rules and regulations of the Association and to settle disputes between members. It shall inspect and examine colleges making application for membership and shall inspect colleges in membership in the Association that have been discredited by other evaluating organizations. It shall have power to fill vacancies occurring in any of the elective offices during the year.

ARTICLE VII.

MEETINGS

SECTION 1. The stated meetings of the Association shall occur annually at such place as the Association may designate by vote, the time of meeting to be set by the Executive Council.

SEC. 2. A majority of the active members whose dues are paid shall constitute a quorum.

ARTICLE VIII.

AMENDMENTS

SECTION 1. This constitution shall not be altered or amended except by a written notice to all members at least thirty days previous to a stated meeting and by a vote of two-thirds of all the active members present at such meeting.

BY-LAWS

SECTION 1. The meetings of the Association shall be governed by Roberts Rules of Order, except as provided in the Constitution and By-Laws.

SEC. 2. All schools members of the Association shall be visited

and inspected at least once every five years for the purpose of determining whether the rules and regulations of the Association are being enforced.

SEC. 3. If any school shall be found not to possess the qualifications necessary for membership in the Association, a detailed report on the same shall be made to the Executive Council for consideration. The Executive Council shall submit its report to the Association in annual meeting assembled for final action.

SEC. 4. REQUIREMENTS FOR ADMISSION—Admission to medical schools and medical colleges in membership in the Association may be by:

(1) Satisfactory completion of a minimum of collegiate instruction, as provided below in Subsection I: or by

(2) Examination, as provided in Subsection II.

SUBSECTION I. The minimum of collegiate instruction required for entrance to medical schools and medical colleges in membership in the Association shall be 60 semester hours ⁽¹⁾ of work, which shall include the subjects hereinafter specified, in institutions approved by accrediting agencies acceptable to the Executive Council of the Association. Exception may be made under this section in that any member may admit applicants who have fulfilled the requirement in American or foreign institutions not approved by such accrediting agencies, provided that all admissions so made shall be reported to the Executive Council and shall be published in the next annual report of said Council.

All collegiate instruction given in satisfaction of this requirement must be based upon the same entrance requirements and must be of the same quality and standard of instruction as that required for a baccalaureate degree in the institution in which the candidate receives his preparation.

The 60 semester hours of collegiate instruction, indicated above shall include a minimum total number of semester hours in each of certain required subjects and the specified science subjects shall include a minimum number of semester hours of laboratory work as follows:

Requested Subjects	Minimum total semester hours	Minimum semester hours of laboratory work
1. General Chemistry (a)-----	8	4*
Organic Chemistry (b)-----	4	0
2. Physics (c)-----	8	2*
3. Biology (d)-----	8	4*
4. English Literature and Composition (e) 6		

(1) A semester hour is the credit value of sixteen weeks' work, consisting of one lecture or recitation period per week; each period to be of not less than fifty minutes duration net. At least two hours of laboratory work per week shall be necessary to be considered as the equivalent of one lecture or recitation period.

*Included in minimum total semester hours.

Explanations as to content in each of these required college subjects together with suggestions to desirable additional study in certain subjects are as follows:

(a) *General Chemistry*. Eight semester hours required, including 4 semester hours of laboratory work. In the interpretation of this rule, work in qualitative analysis may be included as part of general chemistry. (2)

(b) *Organic Chemistry*. A completed course of 4 semester hours required, consisting of didactic exercises, which should cover a discussion of the aliphatic, carbocyclic, and heterocyclic series. (3)

(c) *Physics*. Eight semester hours required, of which 2 semester hours shall consist of laboratory work. It is urged that this course be preceded by a course in plane trigonometry. (4)

(d) *Biology*. Eight semester hours required, of which at least 4 semester hours shall consist of laboratory work. This requirement may be satisfied by a course of 8 semester hours in either general biology or zoology, or by courses of 4 semester hours each in zoology and botany, but not by botany alone. Courses in physiology and hygiene, sanitation, entomology, bacteriology, histology and similar subjects covered in the medical curriculum shall not be accepted as part of the premedical college requirement in biology. (5)

Students who present at least 90 semester hours of college work may substitute for the above biologic requirements at least 8 semester hours in the psychologic or sociologic sciences.

(e) *English Composition and Literature*. The usual introductory college course of 6 semester hours or its equivalent is required.

SUBSECTION II. Admission to medical schools and medical colleges in the Association may be granted to candidates on the basis of examinations as hereinafter provided. These examinations shall be conducted by such agencies as may be designated from time to time by the Executive Council of this Association.

(a) Candidates who have completed not less than 60 semester hours of collegiate instruction, but who have failed to complete the full requirements in not more than two of the required subjects may be admitted upon successfully passing examination in these subjects as above provided.

A candidate to be examined under this section must give evidence of scholarship of high order.

(2) It is highly desirable that either the elements of physical chemistry be included in the course in general chemistry, or presented as a supplementary course in the elementary physical chemistry.

(3) It is recommended that additional work be offered in organic chemistry and that this additional work include a fair proportion of laboratory work.

(4) In addition to the required course in general physics it is recommended that colleges provide an elective course suitable for students who desire more knowledge of physics than the general course affords and who expect to apply this knowledge to medicine and biology, rather than to engineering and physics.

(5) In all cases the premedical biological work should emphasize the great generalizations of biology—e. g., the cell doctrine, comparative anatomy and embryology, recapitulation of phylogeny in ontogeny, adaptation to environment, etc. Special attention is called to the value of an elective second year course in general physiology in which a study is made of the application of physics and chemistry to life processes.

(b) Candidates who have completed not less than 90 semester hours of collegiate instruction, but who lack credit in any or all of the required subjects, may be admitted upon successfully passing examinations in these subjects as above provided.

All candidates for the comprehensive examination must present evidence of having accomplished work of distinction in one or more fields of learning.

The standards of instruction shall be as specified under subsection I.

SEC 5—CURRICULUM. The entire course of four years shall consist of from 3,600 to 4,400 hours, distributed as from 900 to 1,100 hours per year, and shall be grouped as set forth in the following schedule, each group to be allotted approximately the percentage of hours of the whole number of hours in the courses as stated.

1. Anatomy, including Embryology and Histology	14	—	18½%
2. Physiology	4½	—	6%
3. Biochemistry	3½	—	4½%
4. Pathology, Bacteriology and Immunology	10	—	13%
5. Pharmacology	4	—	5%
6. Hygiene and Sanitation	3	—	4%
7. General Medicine	20	—	26½%
Neurology and Psychiatry			
Pediatrics			
Dermatology and Syphilis			
8. General Surgery	13½	—	17½%
Orthopedic Surgery			
Urology			
Ophthalmology			
Otolaryngology			
Roentgenology			
9. Obstetrics and Gynecology	4	—	5%
Total	76	—	100%
Electives	24	—	0%

When the teaching conditions demand it, a subject may be transferred from one division to another.

SEC. 6. Any medical school or medical college in membership in the Association may, with the consent of the Executive Council, substitute for the requirement laid down in Section 4 a six year combined collegiate and medical curriculum. The substitute plan shall provide the inclusion of the equivalent of at least sixty semester hours of subjects ordinarily given in the academic departments of standard American colleges of arts and science, including the required subjects specified in Section 4. In addition, the plan shall include requirements equivalent to the curriculum set forth in Section 5. The medical school must submit to the Council of the Association the proposed six year curriculum giving the sequence of studies and the content and credit value of each course offered. Subsequent proposed changes in this six year course must likewise be submitted to the Executive Council for approval before they go into effect.

SEC 7. The Association through its Council and Committees is prepared on request to act in an advisory capacity to institutions engaged in preparing students for entrance to medical schools and medical colleges.

SEC. 8. These by-laws may be *amended* only by submitting a written copy of the proposed amendment twenty-four (24) hours before action can be taken on it, and by a two-thirds vote of the members represented at any annual meeting. This rule does not apply to Sections 4 and 5, which are subject to amendment only after having given written notice of a proposed amendment at least thirty days previous to taking action on it.

On motion, duly seconded, the several items of recommendation in the report of the Executive Council were taken up seriatim for action.

It was duly moved and seconded that the recommendation to accept the application for membership in the Association of the Faculty of Medicine of the University of Manitoba be concurred in.

The motion was carried unanimously.

It was duly moved and seconded that the recommendation to accept the application for membership in the Association of the New York Postgraduate Medical School be concurred in.

The motion was carried unanimously.

It was duly moved and seconded that the recommendation to increase the annual dues to \$100 per year be concurred in and that such action be considered as the disposition of the amendment offered by the Northwestern University Medical School.

The motion was carried unanimously.

It was duly moved and seconded that the recodified constitution and by-laws as submitted to the membership in proof be accepted.

The motion was carried unanimously.

It was further moved and seconded that the recommendation to withdraw from membership in the American Conference on Hospital Service be concurred in.

The motion carried unanimously.

It was duly moved and seconded that the recommendation to renew membership in the American Council on Education be concurred in.

The motion was carried unanimously.

On motion regularly made and seconded the report of the Executive Council was adopted as a whole.

REPORT OF COMMITTEE ON MEDICAL EDUCATION AND PEDAGOGICS

The report of this committee was made by its chairman, Dr. A. S. Begg. It was as follows:

We have been pretty busy for the last few years taking up the revision of the curriculum and the modification of the present medical requirement, and then the changes in the by-laws which took place two years ago at Omaha and last year at Boston came, and the time under which we have been operating under the new by-laws has

been so short that we have been unable to get any information as to the working of these by-laws.

It is probably apropos to remark that Dr. Cabot was right in saying that some of the members did not read the report of the last meeting because I have had telegrams and letters protesting against the addition of the amendment that was adopted at the Boston meeting.

One of the things we would like to get at in this Committee is the matter of some of the difficulties in some of the situations that arise out of the interpretation or administration of the present medical requirement. I sent a letter to the various schools requesting some sort of a report at this meeting. I have had no reports handed to me, so probably most of you have not had a chance to analyze the situation regarding the entering class this year.

(Signed) A. S. BEGG, Chairman.

It was regularly moved, seconded, and voted that this report be accepted.

REPORT OF COMMITTEE ON SURVEY

Dr. Cabot, chairman of the committee on survey of medical education appointed in 1924, reported that the committee has completed the work assigned to it. The membership of the Commission on Medical Education met and organized. The funds needed for this work have been subscribed and amount to about \$135,000. The colleges in membership in the Association have contributed about \$30,000 of this sum, and this could be increased by several thousand dollars if seven or eight of the colleges who have not subscribed were to do so.

Therefore, the committee felt that having performed its work, it automatically goes out of existence.

At this juncture, the chair introduced Dr. Willard C. Rappleye, of New Haven, Conn., the director of study of the Commission on Medical Education, who outlined the plans of the Commission, as follows:

DR WILLARD C. RAPPLEYE, New Haven, Conn.: It is a privilege to come before you to tell you something of the preliminary work of the Commission on Medical Education and to enumerate briefly some of the general topics that were discussed at the organization meeting of the Commission held in Buffalo a week ago. The personnel of the Commission is as follows: Walter L. Bierring, George Blumer, Hugh Cabot, Samuel P. Capen, William Darrach, David L. Edsall, Sir Robert A. Falconer, Henry G. Gale, Walter A. Jessup, A. Lawrence Lowell, Thomas S. McDavitt, Lafayette B. Mendel, Wm. Allen Pusey, Willard C. Rappleye, Olin West, Ray Lyman Wilbur, Hans Zinsser.

At the meeting Mr. A. Lawrence Lowell was elected the Chairman of the Commission, Dr. Fred C. Zapffe, Treasurer, and myself Director of Study and Secretary.

Practically the entire meeting of the Commission was devoted to discussion of the various problems associated with medical education and probably an enumeration of these topics will be the best way to report the meeting.

A. General Considerations:

Medical education, an exaggeration of all problems of education in part to:

- a. Complexity and ramifications of medicine.
- b. Dependence on previous education.
- c. Relationships to patients and community, legal, financial, professional, etc.
- d. Relationships to graduate teaching and specialization.

Present dissatisfaction with medical education but full recognition of its present high standards and effectiveness relative to other forms of professional training.

Purpose of medical education. Eighty per cent of graduates of medicine enter practice in some capacity, others need knowledge of clinical medicine or such knowledge is valuable to them. Basic course should probably be considered as the preparation of adequately qualified individuals for medical practice.

What constitutes general medical practice? What should a general practitioner know and what should he be able to do? Result of medical education cannot be finished product but an individual able to intelligently and safely begin the practice of medicine.

Necessity of squaring medical education with medical service, particularly preparation of medical men and women competent to meet future needs of proper health and medical services. Probable future needs in community health work and medical practice—preventive work, clinic affiliations, continuation of contacts with medical progress, etc.

Increasing interest on the part of the public in health matters, largely developed through non-medical education of communities and general public.

General practitioner versus specialist in the health program. Possibility of separation in licensure to practice and in "accrediting" practitioners. Question of two types of medical schools to meet situation.

High proportion of illnesses not requiring costly or special diagnostic or therapeutic methods.

High proportion of nonmedical factors in many ailments—economic, religious, social and psychological.

Shift toward preventive medicine in general practice and toward organization of groups in diagnosis and treatment of difficult problems, suggesting possible marked alteration of future methods of handling illnesses and community health work. Large economic factors involved in changing methods of practice, involving large outlays of capital and large carrying charges which are being passed on to community and constituting one reason for growing public interest, i. e., financial.

High cost of medical services attracting attention of economists, insurance companies, industries and the government—this entire question fundamentally related to present methods of rendering medical service.

Part to be played by non-medical personnel in health program:—dietitians, laboratory technicians, nurses, physiotherapists,

mental hygienists, etc. Problems of division of labor and control by the medical profession in the best interests of the patient and community.

Necessity of preparing students in fundamentals to allow them to intelligently understand and interpret the developments and demands of medicine in the future. Graduates today practice largely what they were taught rather than most modern methods of diagnosis, treatment and prevention. Need of intellectual adaptability for meeting the needs of the future.

Functions of state licensing boards and bearing on medical education. Such boards primarily designed to test the fitness of candidates for medical practice. Many regulations now hampering the growth of medical education originally prescribed for excellent reasons by the medical profession itself.

Place of investigators, public health officers, executives and other personnel in the medical and health programs.

The large human, social and economic factors in medical education in addition to those of pure education. Such questions as the relationship of illness to unemployment, of ignorance and poverty to ill health, of psychological factors in illness, ratio of physicians to population, necessity of medicine promising attractive livelihood, etc. Relationships of medicine to various community, social and political agencies.

Problems of rural medical services, hospital centers, etc.

B. *Premedical Course.*

Present system of "credits" system, rigid preliminary requirements, unsatisfactory preparation in science, foreign language requirements, relative inattention to other possibly desirable subjects. Many of difficulties go back to pre-college period: i. e., to secondary education.

Relationship of premedical work to medical courses in this and other countries, purposes of premedical course. Should premedical course be under the administration of the college or the medical school? Canadian-British versus American arrangement.

Methods of choosing students for admission to the medical schools:—vocational tests, psychological tests, records, possibility of testing temperament, industry, sense of service, aptitude for scientific work, etc.

C. *Medical Course Proper.*

Evolution of medical education, influence of German and British points of view.

Growth of medical education by accretion without elimination of unnecessary material.

Teaching of too much detail, not enough of principles.

Rigidity of curriculum, outside regulations, enormous overcrowding, lack of correlation between subjects and between theory and application, "spoon-feeding" and secondary school methods of instruction and examination, disproportionate emphasis on some subjects, overemphasis of specialties in the preclinical courses, clinical divisions, "standardization," etc.

The unit of education should be the student and opportunity should be provided for individualization in instruction.

Relationship of the basic course to specialization and graduate medicine, basic course should contain the "common denominator" of experience necessary for future development.

Part to be played by the laboratory courses in preparation for practical work, for mental training and as a basis for sound "self-education" throughout life. Laboratory courses should serve to illuminate rather than demonstrate entire subject matter. Present overemphasis in teaching of unusual and killing diseases with too little emphasis on the conservation of health, early diagnosis, care of simple ailments and mild early mental disorders, and on the prevention of illness.

The importance of physical therapy in treating many illnesses, Tendency to teach students what the instructors are interested in rather than what the student needs.

Cost of medical education and costs of adequate medical services.

D. *Teaching Personnel*

Methods of choosing teaching personnel. Effort should be directed toward securing the highest possible intellectual leadership. Do present methods promise to do this?

Importance of having good teachers in medicine as well as investigators.

Tendency to place laboratory-trained men in charge of clinical divisions and clinical teaching, and reflection of this policy in the medical services of teaching hospitals and in community health work.

Selection of men for teaching purposes on the basis of alleged investigative ability often without regard for teaching or (in clinical divisions) for clinical ability.

After a general discussion, a committee of the Commission was appointed to attempt to make arrangements with state licensing boards for a truce of a limited number of years during which any class A medical school which desires to do so may experiment with medical education without penalty to its graduates. This committee was authorized to increase its numbers from any source it desired.

In addition, it was felt important to assemble information on the following questions.

1. What are the present demands on the general practitioner?
2. What are the needs which the general practitioner should be able to meet?
3. What is the past history of successful practitioners?
4. What are the methods now in use of selecting students for admission to medical schools?

The first step we shall take will be to canvas the medical schools and other possible sources of information on these general questions in order to avail ourselves of any material that has already been assembled.

EMPOWERING EDUCATIONAL EXPERIMENTS

Pursuant to notice given at a previous session, Dr. Ray Lyman Wilbur, moved that the Executive Council be empowered to permit any constituent member of the Association to take free initiative in conducting educational experiments along the lines suggested by the Commission on Medical Education. The Executive Council shall not control what the school shall do but give assurance that any changes that certain schools may make in procedures of education will be of acceptable quality. A similar representation will also be made to the state licensing boards asking that such schools be not penalized by the boards or their graduates prevented from seeking licensure.

The motion was seconded and carried unanimously.

REPORTS OF DELEGATES TO OTHER ORGANIZATIONS

COUNCIL ON MEDICAL EDUCATION OF THE AMERICAN MEDICAL ASSOCIATION

This report was made by Dr. Ray Lyman Wilbur, and was as follows:

The Council at the present time has been somewhat extended in membership. Two new men have been brought into the Council and the Council is endeavoring particularly to see what can be done in connection with the education of the practitioner. We feel that men who get out of the orderly circle of hospital and medical schools all over the country, soon lose the advantages that ought to be offered to them. Just how that can be overcome, or brought about, is somewhat difficult to know. We think, though, that through the County and State Medical Societies methods can be devised that will bring to the doctor who cannot leave his own local community, many of the advantages of modern medical science. Certainly the leaders in the State and County Societies can do that if they want to. That, it seems is one of our prime functions at the present time.

Another thing of primary interest is to try to organize the interne ~~year~~ as an educational project instead of allowing it to be a drifting sort of year in which the interne is entirely at the mercy of the hospital and its staff without regard to the educational features involved. In other words, there are certain procedures which should be taught to all men. We feel we should get an organization of that year so that we will know he has had an experience and a definite one, for instance with the Wassermann reaction, so that he does know how to do this and that, organizing that year as an educational project, check being made upon what the interne does and what the hospital offers him, so that at the end of a year, he has done something else besides give anesthetics, make urinary examinations and write histories. In other words, the interne year is the responsibility of those interested in medical education.

There has been marked improvement in the hospital services of the country. We have had some difficulty because of the attempts in certain states to bring into public hospitals men of inferior training,

not with the degree of Doctor of Medicine, but men who desire to treat the sick, and those men have been mixed in hospitals where internships are offered to the graduates of acceptable medical schools, and that has presented a real problem. The Council has determined that it cannot recognize internship in a hospital which does not protect those who have the degree of Doctor of Medicine and reject those who do not have it. It will make difficulties for us in certain places, but in the long run it will be sound.

On motion, duly seconded, the report was accepted.

AMERICAN HOSPITAL ASSOCIATION

It will be recalled that for the past two years this Association has been represented at the annual meeting of the American Hospital Association; furthermore that this delegate has cooperated with a representative of the American Hospital Association,—the chairman of its Intern Committee, Dr. Nathaniel W. Faxon, superintendent of the Strong Memorial Hospital of Rochester, New York, which is a part of the University of Rochester School of Medicine and Dentistry, —in the survey of the intern problem. The purpose of this survey has been to formulate recommendations acceptable to hospitals and medical schools whereby the time of selection and appointment of interns and a schedule or plan of their duties may be made mutually agreeable and advantageous to all concerned.

This committee has received much encouragement from hospitals and the earnest cooperation of this Association. The suggestion of this Association that the selection and appointment of interns be deferred until after March 15 of each year has met with approval to a very pleasing degree. The committee has now completed its task and at the annual meeting of the American Hospital Association held in Louisville last week the third and final report was submitted with the following recommendations:

1. That the schedule of "essentials" in a hospital approved for interns as prepared by the Council on Medical Education and Hospitals of the American Medical Association be accepted as a standard by hospitals and medical schools.
2. That the Trustees of the American Hospital Association consider the advisability of making application for representation in the Council on Medical Education and Hospitals of the American Medical Association and take such action as they may determine.
3. That the American Hospital Association requests adherence of its members to the relationship between hospital and intern as set forth in the "schedule of essentials" in hospitals approved for intern service, and that it collect information regarding the non-adherence of hospitals to this schedule and instances of repudiation of agreements by interns and that it publish such portions of this information as may be desirable or furnish this information to other organizations, such as the American Medical Association, the American College of Surgeons, and the Association of American Medical Colleges.
4. That the American Hospital Association collect and supply to medical schools data relating to the intern service in various hospitals, and to hospitals similar data regarding graduating students in medical schools.

That the American Hospital Association request its members not to appoint interns or to hold examinations for interns until the student has completed three and one-half years of medical study; preferably between March 15th and April 1st.

That individual arrangement be allowed hospitals as to the mode of selection of interns—by certification from medical schools, by appointment on recommendation without examination, or by examination. While recognizing the inherent difficulties we still recommend, wherever possible, that the hospital inspect the candidate and the candidate inspect the hospital.

5. That the American Hospital Association establish an Advisory Committee on Interns, this committee, upon request, to advise and assist hospitals in selecting that type of intern organization best suited to their needs.

6. The establishment of the following types of hospital internships and residencies from which hospitals may select:

First: Rotating internships of one year, with service in medicine and surgery—medicine to include pediatrics and laboratory work and surgery to include obstetrics; this minimum may be lengthened to eighteen months or two years provided it is warranted by increased educational values. Such rotating internships to be supplemented by residencies of one year or more for graduate interns. These are essential for the proper care of patients and to provide opportunities for those who wish to obtain further proficiency before entering practice.

Second: Nonrotating internships in certain hospitals with highly organized resident systems with continuous intern service in one department of medicine. If of one year duration and the work is limited to medicine or surgery, the intern should be encouraged to complete both services. If longer, they should be so modified as to include some training in other departments. The combination of a short general training in one department offers a very desirable form of internship.

Third: Residencies or special internships in special hospitals, such as eye, ear, nose and throat, orthopedic, obstetrical, children's, mental, tuberculosis, to be taken only by interns who have completed the minimum intern year. Residencies should be offered in general hospitals for further training in the major departments, as noted above, to supplement internships in such hospitals.

Fourth: That there be established residencies in suitable hospitals not approved for intern training, to be filled by graduate interns, that these hospitals may have the benefits to be derived from a resident physician and that graduate interns may have wider opportunities for further training before undertaking independent practice.

This report was referred for consideration to the Trustees of the American Hospital Association. It is believed that it will be recommended for adoption.

Respectfully submitted,

(Signed) FRED C. ZAPFFE.

Dr. A. C. Bachmeyer, president of the American Hospital Association, stated that the time which has elapsed since the close of the convention of the American Hospital Association has been too short for action; that the matter will be taken up by the trustees of the association in November or December, and that they will, doubtless do all in their power to carry out the recommendations of their committee.

On motion, duly seconded, Dr. Zapffe's report was accepted.

AMERICAN CONFERENCE ON HOSPITAL SERVICE

This report was made by the secretary, Dr. Zapffe, and was as follows:

Your secretary attended the annual meeting of the Conference in March, 1924. Routine business was transacted, including the election of officers for the ensuing year, the former officers being re-elected.

No business of any interest to the Association in an educational way was transacted—therefore, there is no report to make.

On motion, duly seconded, the report was accepted.

NEW BUSINESS

Under this heading was scheduled the amendment increasing the annual dues. This matter had already been disposed of in connection with the acceptance of the recommendation made by the Executive Council to adopt the amendment.

ELECTION OF OFFICERS

At this juncture, the Chair called for the Report of the Nominating Committee of which Dr. Irving S. Cutter was chairman, the committee having been duly appointed by the Chair.

Dr. Cutter reported that in view of the short time that has elapsed since the previous meeting of the Association, the committee recommended that the present officers be re-elected for the ensuing year.

A motion to that effect was made and seconded. It was passed unanimously and the secretary was instructed to cast one ballot for the election of the present incumbents, which he did. The officers were then declared to be duly elected to serve for another year.

PLACE OF NEXT MEETING

The Chair called for proposals for the place of holding the 1926 meeting of the Association.

Dr. C. A. Hamann extended an invitation to meet in Cleveland and Dr. Wm. Keiller invited the Association to meet in Galveston.

On motion of Dr. Niles, seconded by Dr. Rushmore, it was voted unanimously that the Association meet in Cleveland in 1926.

The meeting was then adjourned until 2 p. m. the following day.

SECOND DAY

On the morning of the second day, the delegates visited the Medical College of the State of South Carolina and the Roper Hospital in which most of the clinical work of the college is done. The delegates were entertained at luncheon in the college.

The delegates reconvened at 2:30 p. m. and the meeting was called to order by the vice-president, Dr. D. L. Edsall.

The program consisted of the Round Table Conference consisting of short talks by the following:

Dr. Irving S. Cutter: "The Content and Conduct of the Quiz."

Further discussion by Drs. Wm. Keiller, W. H. MacCraken, B. C. H. Harvey, W. F. R. Phillips.

Dr. Oskar Klotz: "The Clinico-Pathologic Conference."

Further discussion by Dr. G. Canby Robinson and Dr. Klotz.

Dr. B. C. H. Harvey: "The Irregular Student in the Medical School."

Further discussion by Drs. Irving S. Cutter, Walter L. Niles, Hugh Cabot, George W. Corner, D. L. Edsall, C. Sumner Jones and Dr. Harvey.

Dr. W. F. R. Phillips: "Use and Abuse of Notebooks."

Further discussion by Drs. W. H. MacCraken, Wm. Keiller, Wm. Darrach, Hugh Cabot, D. L. Edsall and Dr. Phillips.

Dr. G. Canby Robinson: "Value of the Seminar in Medicine."

Further discussion by Drs. N. P. Colwell, Stephen Rushmore, Robert Wilson, Harold Rypins, Clyde Brooks and Dr. Robinson.

Dr. W. H. Goodrich: "Attendance on City's Sick Poor as Part of Clinical Instruction."

Further discussion by Drs. H. C. Tinkham, W. H. MacCraken, Walter L. Niles and Dr. Goodrich.

Dr. Cabot resumed the chair.

There being no further business to come before the Association, it was voted to adjourn to meet in Cleveland in 1926 at such time as the Executive Council may designate.

(Signed) HUGH CABOT, President,
FRED C. ZAPFFE, Secretary.

MINUTES OF THE ORGANIZATION MEETING OF THE EXECUTIVE COUNCIL

A meeting of the Executive Council was held in the Fort Sumter Hotel at 5:30 p. m., October 27, 1925, with the following members of the Council present: Dr. Hugh Cabot, Dr. Walter L. Niles, Dr. Irving Cutter and Dr. Fred Zapffe.

The meeting was called to order by the Secretary.

On motion of Dr. Cabot, duly seconded, Dr. Walter L. Niles was elected chairman of the Executive Council for the ensuing year.

On motion, duly seconded, delegates to other organizations were appointed as follows:

Council on Medical Education and Hospitals of the American Medical Association: Dr. Ray Lyman Wilbur.

Federation of State Medical Boards: Dr. Fred C. Zapffe.

On motion, duly seconded, it was voted to hold the next meeting of the Association October 25, 26 and 27, 1926.

The following Committee on Education and Pedagogics was appointed: Dr. Alexander S. Begg, Boston University, chairman; Dr. S. P. Capen, University of Buffalo; Dr. G. Canby Robinson, Vanderbilt University; Dr. Burton D. Myers, Indiana University, and Dr. L. S. Schmitt, University of California.

The following Committee on Medical Research was appointed: Dr. Lewis H. Weed, chairman, Johns Hopkins University; Dr. Cecil Drinker, Harvard University, and Dr. Don R. Joseph, St. Louis University.

On motion, duly seconded, the secretary was voted an honorarium for the ensuing year of \$2,000.

(Signed) WALTER L. NILES, *Chairman*,
FRED C. ZAPFFE, *Secretary*.

OFFICERS AND COMMITTEES FOR 1926-1927

President: HUGH CABOT, Ann Arbor, Michigan.

Vice-President: DAVID L. EDSALL, Boston.

Secretary-Treasurer: FRED C. ZAPFFE, 25 East Washington St., Chicago.

EXECUTIVE COUNCIL

WALTER L. NILES, Chairman, New York.

CHARLES P. EMERSON, Indianapolis.

IRVING S. CUTTER, Omaha.

CHAS. F. MARTIN, Montreal.

RAY LYMAN WILBUR, Stanford University, California.

HUGH CABOT, Ann Arbor, Michigan.

FRED C. ZAPFFE, Chicago.

COMMITTEES

Committee on Education and Pedagogics

ALEXANDER S. BEGG, Chairman, Boston University.

BURTON D. MYERS, Indiana University

G. CANBY ROBINSON, Vanderbilt University.

S. P. CAPEN, University of Buffalo.

L. S. SCHMITT, University of California.

Committee on Medical Research

LEWIS H. WEED, Chairman, Johns Hopkins University.

DON R. JOSEPH, St. Louis University.

CECIL DRINKER, Harvard University.

MEMBERS

ALABAMA

University of Alabama, School of Medicine, University.

CALIFORNIA

College of Medical Evangelists, Loma Linda and Los Angeles.

Stanford University School of Medicine, San Francisco and Stanford University.

University of California Medical School, San Francisco and Berkeley.

CANADA

McGill University Faculty of Medicine, Montreal.

University of Manitoba Faculty of Medicine, Winnipeg.

University of Toronto Faculty of Medicine, Toronto.

COLORADO

University of Colorado School of Medicine, Denver.

CONNECTICUT

Yale University School of Medicine, New Haven.

DISTRICT OF COLUMBIA

Georgetown University School of Medicine, Washington.
 George Washington University Medical School, Washington.
 Howard University School of Medicine, Washington.
 Army Medical School, Washington.
 Navy Medical School, Washington.

GEORGIA

Emory University School of Medicine, Atlanta.
 University of Georgia Medical Department, Augusta.

ILLINOIS

Loyola University School of Medicine, Chicago.
 Northwestern University Medical School, Chicago.
 University of Chicago (Rush Medical College), Chicago.
 University of Illinois College of Medicine, Chicago.

INDIANA

Indiana University School of Medicine, Bloomington and Indianapolis.

IOWA

State University of Iowa College of Medicine, Iowa City.

KANSAS

University of Kansas School of Medicine, Lawrence and Rosedale.

KENTUCKY

University of Louisville Medical Department, Louisville.

LOUISIANA

Tulane University of Louisiana School of Medicine, New Orleans.

MARYLAND

Johns Hopkins University Medical Department, Baltimore.
 University of Maryland School of Medicine and College of Physicians
 and Surgeons, Baltimore.

MASSACHUSETTS

Boston University School of Medicine, Boston.
 Medical School of Harvard University, Boston.
 Tufts College Medical School, Boston.

MICHIGAN

Detroit College of Medicine and Surgery, Detroit.
 University of Michigan Medical School, Ann Arbor.

MINNESOTA

University of Minnesota Medical School, Minneapolis.

MISSISSIPPI

University of Mississippi School of Medicine, University.

MISSOURI

St. Louis University School of Medicine, St. Louis.
 University of Missouri School of Medicine, Columbia.
 Washington University Medical School, St. Louis.

NEBRASKA

John A. Creighton Medical College, Omaha.
 University of Nebraska College of Medicine, Omaha.

NEW YORK

Albany Medical College, Albany.
 Columbia University College of Physicians and Surgeons, New York.
 Cornell University Medical College, Ithaca and New York.
 Long Island College Hospital, Brooklyn.
 New York Post Graduate Medical School, New York.
 Syracuse University College of Medicine, Syracuse.
 University and Bellevue Hospital Medical College, New York.
 University of Buffalo Department of Medicine, Buffalo.

NORTH CAROLINA

University of North Carolina School of Medicine, Chapel Hills.
 Wake Forest College School of Medicine, Wake Forest.

NORTH DAKOTA

University of North Dakota School of Medicine, University.

OHIO

Ohio State University College of Medicine, Columbus.
 University of Cincinnati College of Medicine, Cincinnati.
 Western Reserve University School of Medicine, Cleveland.

OKLAHOMA

University of Oklahoma School of Medicine, Norman and Oklahoma City.

OREGON

University of Oregon School of Medicine, Portland.

PENNSYLVANIA

Hahnemann Medical College and Hospital, Philadelphia.
 Jefferson Medical College of Philadelphia.
 University of Pennsylvania School of Medicine, Philadelphia.
 University of Pittsburgh School of Medicine, Pittsburgh.
 Woman's Medical College of Pennsylvania, Philadelphia.

PHILIPPINE ISLANDS

University of the Philippines College of Medicine and Surgery, Manila.

SOUTH CAROLINA

Medical College of the State of South Carolina, Charleston.

SOUTH DAKOTA

University of South Dakota College of Medicine, Vermilion.

TENNESSEE

Meharry Medical College, Nashville.
 University of Tennessee College of Medicine, Memphis.
 Vanderbilt University Medical Department, Nashville.

TEXAS

Baylor University College of Medicine, Dallas.
 University of Texas Department of Medicine, Galveston.

UTAH

University of Utah School of Medicine, Salt Lake City.

VERMONT

University of Vermont College of Medicine, Burlington.

VIRGINIA

Medical College of Virginia, Richmond.
 University of Virginia Department of Medicine, Charlottesville.

WEST VIRGINIA

West Virginia University School of Medicine, Morgantown.

WISCONSIN

Marquette University School of Medicine, Milwaukee.
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