ASSOCIATION OF AMERICAN MEDICAL COLLEGES

PROCEEDINGS OF THE THIRTY-SECOND ANNUAL MEETING, HELD AT CHICAGO MARCH 6 and 7, 1922

TABLE OF CONTENTS

THE UNIVERSITY THE NATURAL HOME OF THE MEDICAL SCHOOL: ADDRESS OF PRESIDENT

THEODORE HOUGH
UNIVERSITY OF VIRGINIA
UNIVERSITY, VA.

In January, 1921, I published the results* of the most careful and impartial study I was able to give to the problem of location of medical schools of universities situated in small cities or towns. During the succeeding fifteen months I have had the advantage of advice and criticism from educators to whom I am deeply indebted; and a hard political struggle over the location of the Medical Department of the University of Virginia has forced me to live night and day with this problem. I think I can justly claim that during this whole time I have been my own severest critic, for the responsibility for sound advice to my university is a heavy one.

I have seen no reason to change the general conclusions I reached over a year ago; indeed, I am more strongly convinced of their soundness; but here and there the perspective and the lights and shadows have changed and new points of view have opened up. This is partly my excuse for a renewed discussion of the subject; although, in strict confidence, I confess that the chief reason for making this topic the subject of this address is that after living with the problem for two long years (and, indeed, until only ten days ago) I find that, for the time being, I have a "single track" mind which lacks the versatility necessary for profitable discussion of another subject.

It would be obviously improper for me to make any reference to the local aspects of the recent struggle in Virginia between the advocates of the retention of university location of the Medical Department of the University of Virginia and the advocates of separate location of that department one hundred miles away in the city of Richmond. I am now concerned only with general principles involved in the question.

SEPARATE LOCATION IN ITSELF NOT DESIRABLE

One can hardly conceive that any one would regard separation from the rest of the university, in itself, an advantage to

*Hough: Alumni Bulletin of the University of Virginia, 1921, XIV, 1.

any medical school. Mr. Flexner well stated this point in his advice to the Commission on Medical Education in Virginia:

> If the university were itself situated in Richmond or Norfolk, nobody would dream of suggesting that the medical school should be located somewhere else. That is, everybody would admit that the school would be stronger, and university administration would be more effective, if the entire university were concentrated. Everybody would admit that university spirit would be weaker and university administration less effective in any department—medicine, engineering, law, or what not—which was removed from the university campus. I take it therefore that, generally speaking, everybody would be in favor of concentration and against dispersion. The burden of proof rests, therefore, upon those who favor removal. They must show that medical education will gain, not lose, by the transfer of the medical school from Charlottesville to Richmond.
>
> In order that the university may train its students most effectually during the four years of the medical course, it needs, in the first place, laboratories, teaching staff and teaching facilities in the fields of anatomy, physiology, pathology, bacteriology, bio-chemistry and pharmacology. These laboratories are not independent of each other, nor are they independent of other scientific branches which the university develops. The various sciences are continuously intersecting one another, so that no one of them and no group of them can be detached without loss to itself and to its fellows. As far as these sciences are concerned, therefore, they cannot be detached from the university without injury to themselves and to other sciences. The medical sciences will suffer if they leave the university campus. And if they suffer, medical education is to that extent injured. This proposition would also, I believe, be accepted by all.

I confess to surprise and not a little disappointment at the failure of a few medical educators to set the very highest value on university contacts and environment. This is certainly not the attitude of the majority of teachers who have expressed themselves on this subject. Nor does it seem to be the attitude of universities themselves, if we may judge by recent decisions in this matter. During the past five years the great universities of Wisconsin, Missouri and Chicago have definitely planned to locate their medical schools permanently on the university campus. Vanderbilt is spending three million dollars to do away with the two miles which at present separate her medical school from the main university. Columbia, though unable actually to locate on the campus, is concentrating its medical activities on

a site which, considering the rapid transit facilities of New York City, virtually places it in intimate association with the rest of the university. The University of Rochester shows its appreciation of the principle by moving the rest of the university to the site of its new medical school. Only California and Colorado among those who have considered the question of late years have decided in favor of separate location. It would seem that the clear trend of the thought of today is toward bringing the medical school into the closest possible contact with the rest of the university.

UNIVERSITY LOCATION DEMANDED BY FUTURE NEEDS OF MEDICAL EDUCATION

There are compelling reasons for this trend. We are looking to the future of medical training and two advantages of university location loom large as we contemplate that future. First, the interdependence of medical and other sciences will become increasingly intimate. One has only to recall the advances in our practical knowledge of electrocardiography, of acidimetry, of genetics, of the transmission of disease by insects, and of the preparation of synthetic drugs in the past decade to see the truth of this. The physician will call more and more on the chemist and the physicist, on the botanist and the zoologist, on the psychologist and the sociologist—even on the mathematician—for assistance, and he will need this assistance in ever increasing measure.

Second, the program of this meeting shows that the medical curriculum is not fixed for all time. Our present sharp division between premedical, preclinical, clinical and intern years is doubtless sound, on the whole; but in many respects it is unsatisfactory. We see our Canadian brethren engaged in an important experiment involving considerable redistribuiton of subjects in the grand divisions of the curriculum, and other similar experiments doubtless should be made. University location maintains the desirable plastic character of the entire medical curriculum from the high school to the M. D. degree. It also preserves the possibility of medical students taking elective courses in other university subjects, such as psychology, sociology, advanced physics, chemistry, or biology, and even language. This is certainly highly desirable, despite the crowded character of the

curriculum—against which there are signs of a healthy reaction. Only less important is the possibility of the medical school, and especially the scientific branches of the medical school, serving the needs of students in other departments of the university. There should be more of this than at present.

Many other considerations, which I have fully discussed elsewhere, add their weight to the scale in favor of university location of medical schools; but the two considerations mentioned justify the title of this paper—"The University the Natural Home of the Medical School."

CLINICAL NEEDS THE ONLY POSSIBLE JUSTIFICATION OF SEPARATE LOCATION. PEDAGOGIC FUNDAMENTALS OF CLINICAL TEACHING

Only one possible reason can justify separation of the medical school from the rest of the university, and that is the proof that one cannot have at the university in question abundantly adequate clinical material for the instruction of third and fourth year medical students, or can obtain it only at prohibitive expense. (Unlimited clinical material is neither needed nor desirable.)

What is meant by abundantly adequate clinical material? The answer is not to be sought in the attempt to provide for every possible need of medical education and research; for medical education includes graduate instruction and other agencies which contribute toward greater efficiency of medical practice; and medical research is both varied and limitless in scope. The four year course of the medical school merely provides the fundamental training for all those who are to engage in medical service of any kind whatsoever. Its clinical needs are strictly limited to those of the two years of fundamental clinical training. Mr. Flexner has pointed out that the object of the four years course leading to the M. D. degree is "evidently not to make doctors, because, if such were the case, the four year course would not have to be followed by an internship in a hospital." And he goes on to say:

> The four-year medical course can, at most, ground the student in the fundamental medical sciences, train him in the art and technique of diagnosis and give him a limited practical experience in using his knowledge and his technique under the eye of trained teachers; thus, by the time he leaves

> the medical school the student will have mastered the tools which will ultimately enable him to practice medicine and surgery with safety and intelligence. Medical education is, as has been said, mostly education, not mostly practice. The range of disease is so vast that it is utterly impossible for the student to master it or to master any considerable portion of it during his four-year course in the medical school. Indeed, he spends over two years learning anatomy, physiology, chemistry, bio-chemistry, pharmacology, etc., which are, once more, only the tools by means of which he is going to grapple with the problem of disease. Then follow two brief years in which at the most he can be trained how to use the technique and knowledge which he has been acquiring, how to observe, how to reason, and how, in a few representative instances, to deal with pathological conditions. The medical curriculum, therefore, does not produce doctors. It trains men in the knowledge and use of a technique by means of which they may in time hope to become physicians and surgeons.

I would add that the more clearly the medical world realizes this as its function, and the more faithfully it keeps this in view as the goal of its efforts, the better will it serve the medical needs of the people.

Nor can one mistake the present day recognition of the truth that for the clinical years of the curriculum the quality of teaching is more important than quantity of clinical material. Opinion may be divided on the merits of this or that "full-time" plan; but opinion cannot be divided as to the necessity of vocational teachers of clinical subjects. Teaching and not the demands of private practice must be the primary interest of clinical teachers, for teaching is a man's job. Ten years ago the tendency was to stress clinical material. Today the stress is on teaching.

No less clear is the recognition not simply of the value but of the necessity of complete control by the school of its teaching hospital. We have only to cite the cases of Cincinnati, of Chicago, and of Columbia to emphasize this point. A municipal hospital under political control is an extremely unsafe reliance for the teaching clinic of a school, and few, if any, of them have proved more than moderately satisfactory. Private hospitals under separate boards are often little better. A hospital of 400 beds, preferably owned, but in any case absolutely controlled for teaching purposes, and in which the teaching is by vocational teachers, will give better fundamental training than would be

given by avocational teachers in separately controlled hospitals of two or even three times that number of beds.

MODERN INVENTIONS, IMPROVEMENTS AND TENDENCIES FACILITATE THE DEVELOPMENT OF TEACHING HOSPITALS IN SMALL CITIES AND TOWNS

The large university teaching hospital in a small town is no longer in the experimental stage, for Michigan and Iowa have proved that an abundantly adequate teaching clinic can be secured by this measure. The simple fact is that if you have the hospital buildings and the teaching staff ready "to deliver the goods" there is no difficulty in getting abundance of clinical material. Despite occasional assertion to the contrary, there is nothing artificial about a clinic drawn from a rural population as contrasted with one drawn from an urban population.

The past ten years, and especially the past five years, have wrought striking changes in the possibilities of these clinics in large hospitals in small towns. First among those is the tremendous improvement in the means of transportation to and from the hospital. Good roads and the automobile have revolutionized this aspect of the problem. The hospital ambulance itself can now bring patients, and very ill patients, too, distances of twenty-five or fifty miles with less discomfort or danger than a patient could be transported five miles fifteen years ago. We are no longer dependent entirely on railway service, although this, of course, is still an important means of transportation. Nor do I think I am visionary in looking forward to the day when the ambulance aeroplane will multiply many times the area accessible to the great modern hospital and render it independent of good roads and railroad schedules and connections. The problem of transportation is already largely solved and in the near future it will be solved completely.

The second great change of the past five or ten years which is revolutionizing the possibilities of the state hospital in a small town is the changed attitude of the public toward the hospitalization of disease. This is too familiar a fact to call for elaboration. Wherever the facilities of a large hospital are accessible to a rural population, that population avails itself of the opportunity for diagnosis and treatment to as great an extent as do our urban populations, and we find the medical clinics growing more rapidly than the surgical.

These changes of economic and social conditions are rapidly doing away, or have in some places already done away, with the three chief difficulties in securing satisfactory clinics in small towns; namely, those concerning obstetrics, the outpatient service, and acute and accident cases. These difficulties are as nothing today compared with what they were ten years ago, and they will have disappeared altogether ten years hence.

Obstetrics probably now presents the simplest of these problems. It is being solved by the improvements in transportation and the rapidly growing tendency toward hospitalization of cases of labor. The problem is also changed entirely with the recognition of the fact that, from the pedagogic point of view, six cases of labor attended under proper supervision in a teaching hospital are worth more than twenty cases attended by the student in an outpatient service; and in saying this I have no intention of disparaging the pedagogic value of outpatient obstetric work. I simply assert that its importance has been overemphasized in the past.

As to acute and accident cases and even cases of contagious diseases, this problem is also being solved by improvements in transportation. We are no longer dependent on railways to transport contagious diseases—the automobile and the ambulance have solved or will solve that problem. As to the more common minor acute diseases, the student body of any large university with a properly organized medical service will bring as many of these cases to the clinic as come to city clinics. It is notorious that these cases do not come in large numbers to city clinics.

Time does not permit the discussion of the problem of the outpatient clinics. These clinics are increasing in Michigan, Iowa and Virginia, and they are capable of further development, although they will never compare in size with the great city clinics. They belong for the most part in the fourth year or, better still, the intern year rather than in the third year of the curriculum; and there are clear signs of a readjustment of the place of inpatient and outpatient work in the entire scheme of medical instruction.

ADVANTAGES OF UNIVERSITY CLINICS IN SMALL CITIES

Medical schools usually began as associations of private practitioners to teach medicine, and it was only in the large city that a sufficient number of these practitioners could be assembled to form a faculty. This fact, as much as the greater accessibility to clinical material, is reponsible for the location of most of our medical schools in large cities. The university medical school is a later development and is the outgrowth of a belief in the pedagogic principle that the university is the natural home of the medical school. This principle in cases of university location in small cities or towns had to fight its way against tradition and established custom and it is natural that the difficulties which schools like Michigan and Virginia have encountered should have received greater emphasis than the advantages they enjoy; but there are certain advantages of location away from the great cities which must not be overlooked.

The first of these was pointed out by Dr. Wm. H. Welch, to the Commission on Medical Education in Virginia; namely, that "the university is less hampered in its search for the best teachers. With the school in a large city undue pressure is apt to be brought to bear on the governing body to secure appointments of local physicians to teaching positions and to prevent the selection of men from elsewhere." This is especially true of a state university which is subject to political pressure. In a small town the university has virtually a free hand in selecting men for its teaching staff.

Brief passing reference may also be made in this connection to the widespread fallacy that schools in small cities or towns can secure a competent faculty only by offering princely salaries to successful city practioners. The fact is that this is not the sensible way to recruit the ranks of clinical teachers. There is no valid reason why clinical teachers should not be recruited precisely as other teachers are recruited—namely by serving an apprenticeship at teaching. Universities do not draw their professors of physics or chemistry from highly paid consulting experts of great industrial establishments; why should we attempt to do this in the case of clinical teachers?

Another advantage of location away from the large city is the sifting process which automatically sends relatively larger

numbers of what Dean Cabot describes as the "hard nuts to crack" to the great state hospital, while the easy and simple cases are treated at home by local agencies. There is a sort of "natural selection" of clinical material—doubtless no more perfect than other forms of "natural selection" but far better than no selection at all. Dean Cabot records his experience that for this reason the Michigan hospital actually has a better teaching clinic than the Massachusetts General Hospital. This corresponds to our experience in Virginia. To make the point perfectly clear: The university hospital in a small town receives from its immediate vicinity all the cases of simpler diagnosis it needs, while a relatively larger part of its clinic consists of the more instructive cases of more difficult diagnosis and of great teaching value.

FALLACIES REGARDING UNIVERSITY HOSPITALS IN SMALL CITIES OR TOWNS

There are certain widespread misapprehensions regarding university hospitals like Michigan, Iowa and Virginia. The first of these is that they require special legislation to facilitate the flow of patients to the hospital. This arises out of the existence of the well known Michigan and Iowa laws. The fact is that the number of patients in the Michigan hospital has been steadily rising since 1911 and scarcely shows any change in the rate of increase after the enactment of the law in 1915. Virginia, with no such law, more than doubled the number of patients in the same time and would have trebled the number, as Michigan has done, but for limitations of hospital space. The fact is that the "Michigan law" is simply a system of accounting and is not the cause of the flow of patients to the hospital. Laws of this kind are wise, convenient and useful; but patients go to the hospital because the hospital is there, ready to serve them, not because the law facilitates an "artificial" flow of clinical material.

The second widespread misapprehension is that the clinic in these hospitals consists largely or solely of so-called charity patients, whose entire hospital care and travelling expenses are a charge on public taxation, either state or local or on private endowment. The figures for the Michigan hospital are, in round numbers, as follows: for 1919-1920, out of 17,000 patients, less than 2,000 were state and county patients; for 1920-1921,

out of 18,000 patients, about 2,000 were state and county patients. The director of the hospital, Dr. Parnall, writes: "By far the largest number are patients who are unable to pay professional fees but who do pay hospital charges" and hence are in no way a charge on taxation.

All these patients are "clinical material." In Virginia we have not gone as far as this; our ward charge does not as yet cover more than one-half the per diem cost; nevertheless, even on this basis we received $36,000 from ward patients in 1920-1921, and I am sure this sum can be increased. When one is beginning to build up a clinic in a hospital of this kind, a relatively larger amount of charity work will be necessary; but, as the hospital establishes its clientelle, charity work can and should be strictly limited to those who are unable to pay their hospital charges in whole or in part.

Again, in passing, I would call attention to the good example set by the Michigan hospital in making every patient, even private room patients, "clinical material." Private room patients should not be used for amphitheater clinics and probably not for ward rounds, at least without their consent; but there is no reason whatever why a student should not be associated as clinical clerk with the physician or surgeon in charge, and a large percentage of private patients would gladly consent to a visit from class sections in ward rounds. Many of them, indeed, would greatly enjoy these visits. The private patient in a large teaching hospital commands a medical service he would not enjoy but for the existence of this teaching hospital. It is both just and fair that this fact be recognized in the manner indicated.

Another misapprehension is that large state hospitals enormously increase the cost of medical education to the taxpayer. The fact is that the expenditures of state, counties, or cities for charity service in these hospitals is, for the greater part, money which would have to be expended by the same tax payers for the same service from other agencies and in other hospitals. The large university teaching hospital merely brings these patients to the medical school and makes them available for clinical instruction. It is false accounting to charge the whole or even the greater part of this expenditure to medical education. The expense of these patients is the same whether they are treated

in privately supported or in publicly supported hospitals, and no self respecting state, county or city fails to recognize its responsibility for the care of the needy poor or to provide for it in its annual budget. It is not a new expenditure of money; it is only a question of where the money is spent.

Nor is it true that the entire charity service need come from taxation or from productive endowment. The following figures from the University of Virginia Hospital show how the earnings of the hospital—private rooms and public wards, roentgen ray, etc.,—may help to maintain the clinic. During 1920-1921 the total hospital days for ward patients were 42,078 and the per diem cost was $3.27. Assuming that the per diem cost for ward patients was about $3.00, we have in round numbers:

Cost of ward patients.....	$126,000	
Payments by ward patients.....	36,000	
		$ 90,000
State, City and County appropriations....	54,000	
Expenditures for ward service secured from other earnings (chiefly private rooms)		$ 36,000

It is not claimed that these figures represent an ideal plan of financial support; they represent the best we have been able to accomplish in making the most out of our available sources of support; but they show the possibilities of maintaining a large clinic with very moderate income from taxation.

DENTISTRY A BRANCH OF MEDICINE. THE UNIVERSITY THE PROPER HOME OF THE DENTAL SCHOOL

In our recent discussion in Virginia, the advocates of urban location of the Department of Medicine made the point that dentistry has become a medical specialty and the dental school should be closely connected with the medical school. They further claimed that a dental clinic cannot be obtained in a small town. Hence, it was argued, the medical school should be torn away from the rest of the university in order to bring it into intimate union with the dental school.

The whole argument depends on the false premise that a

dental clinic cannot be obtained in a small town. Michigan and Iowa have large and successful dental schools—among the best in this country, and at no undue expense.

I would take this opportunity to record my assent to the proposition that the dental school of the future should be closely associated with the medical school; and also to urge that, inasmuch as dental schools, with at least one year of predental college work, are now on a university basis, they should likewise be located in the university itself, their natural home. The next decade will witness the transition of dental schools from the proprietary basis to the university basis, just as medical schools made this change for the most part in the first decade of this century. It is significant of the best dental opinion on this subject that the Dental Faculties of American Universities at its Montreal meeting in January, 1922, unanimously endorsed the location of our Virginia Dental School at the University rather than in Richmond.

Dentistry is becoming a university subject; but it does not make this change, as did medicine, with the prestige of position in popular estimation as one of the so-called learned professions. In the future it must recruit its ranks from college students and not as in the past from the ranks of high school students. The attitude of the public at the present time is not such as to attract college students to this profession or will college faculties for some time to come encourage their students to go into dentistry as a life work. The location of dental schools on the campus of large state universities will do more to change this attitude of the public and to attract college students to that profession than any other one measure.

UNIVERSITIES THE PROPER HOME OF SCHOOLS OF PUBLIC HEALTH

The other great branch of medical science and education is public health. Here, again, there is every reason for the closest possible contact with the rest of the university. Apart from the recruiting value of university location to a new profession which is calling loudly for recruits, the relations of public health to chemistry, to zoology, to economics, to sociology, to engineering and other branches of university effort, make university location the only proper policy.

Only one rival claimant, so to speak, can compete with the university for the location of a school of public health. It may be and has been urged that these schools should be in close contact with state and city health departments, which may serve as the "clinical laboratories" of the school. There are, indeed, certain possibilities of advantageous cooperation in this contact, but these do not outweigh the advantages of university location. In the first place, lack of immediate contact with the offices and laboratories of boards of health does not preclude a large amount of cooperation with these state and city agencies in the training of students. In the second place, state and city boards of health are subject to political influences which may seriously detract from the highest efficiency of the university department. In fact, there are positive advantages in having a strong and independent university school of health devoted to the advancement of our knowledge and practice in that field as a stimulus to the state and city boards of health to do their best work. In my judgment, the university school of public health needs the stimulus of contact with practical workers much less than the practical worker need the stimulus of independent constructive criticism from productive scholarship. At any rate university location does not exclude cooperation of these two divisions of the army, and in case that cooperation is lacking, we may safely rely in the long run on public opinion for an explanation and adjustment.

CONCLUSION

There is, therefore, no department of undergraduate medical education—medicine, dentistry, public health—in which university location does not present inestimable advantages which are sure to become increasingly important with each future decade. I cannot refrain from recording my conviction that the only correct course, when this question is presented for solution, is to lay the foundations of policy deep in correct educational principles and to resist the temptation to decide the matter on the basis of temporary embarrassment or expediencies arising out of existing financial, political, institutional, or sociological conditions. All these are remediable with time—and Iowa and Michigan have demonstrated that an eternity of time is not necessary to remedy them! In the case of the future of my own

school, the significant consideration to me lies not in its present defects—of which I am fully aware—nor in the present difficulties—of which I am daily conscious—but in the distance we have travelled toward our goal during the past ten years. This shows me that there is not one defect which time cannot remedy, not one difficulty which cannot be overcome relatively easily.

Ideals are seldom attained in a day, or a week, or a year. It takes only a few weeks to grow a gourd; it takes a century to grow an oak; and we should not hesitate to embark on a correct educational policy merely because it cannot be fully realized at once. I am speaking from experience in this very field when I express to those who have this question to decide my own deep and abiding conviction that if you will but enter on the policy of university location with a patient but fixed determination to see it through, you will be rewarded with the discovery that progress will be more rapid than you anticipate. You will face spectres in your path, but, if you only push on, you will find that you "walk straight through these spectres as if they were not there."

Finally, while time lessens and removes the disadvantages of university location, the defects and evils of separate location are real defects and evils, and they are fundamental; they will become more patent with the future; above all, they are irreparable. The question should be thought out and decided in the light of the future, not that of the past or present.

THE STUDENT INTERNSHIP

E. P. LYON
UNIVERSITY OF MINNESOTA MEDICAL SCHOOL
MINNEAPOLIS

The student internship is a war baby. It is now big enough for its parents to brag about. It is also appropriate for other people to lend a courteous ear and then talk about mamma and the baby behind their backs.

WAR CONDITIONS IN TWIN CITY HOSPITALS

During the war the hospitals of Minneapolis and St. Paul, like others all over the country, were hard put to it in the matter of interns. As in other schools, so we at Minnesota turned to senior medical students. Some of these were excused from regular clinics, and even from part of their didactic work, and permitted to live in the hospitals and do intern work. Many of these students had not been prepared by previous clerkship training for their intern duties. Nevertheless, they got along well and were enthusiastic in regard to their opportunities and progress. Many of the staff men remarked on the hard work, attention to duty, eagerness to learn and becoming medical modesty of these acting interns. When it came to examinations, they seemed to do as well as other students.

It struck us that if this plan could work satisfactorily in war time, it might work in peace time; that here was a good opportunity for an experiment in medical education. The quarter system adopted in S. A. T. C. times contributed a convenient framework for the revised curriculum.

HOSPITALS ENGAGED IN PLAN

The superintendents of the municipal hospitals of Minneapolis and St. Paul, where we have always done a large amount of teaching, entered heartily into the plan. Without Dr. Ancker at St. Paul and Dr. List at Minneapolis, the plan could not have been put into effect. We feel greatly indebted to these men for their genuine interest in medical education. Each hospital placed its "junior internships" at the disposal of the medical school for undergraduate instruction. Each of these hospitals now takes twelve student interns at a time for six months, or

twenty-four men in a year. The university obligates itself to assign that many senior students to each place.

At the University Hospital not so many students could be taken because that hospital is smaller and carries on the clerkship instruction; but by combining with the State Hospital for the Crippled and Deformed and the Hennepin County Tuberculosis Sanatorium, a rotating service for six men at a time (or twelve per year) has been arranged.

Thus, we have facilities so that thirty men at a time get two quarters, or six months, hospital residence in their senior year. We are obligated to fill that many places. By the four quarter system we accommodate sixty students per year.

The Miller Hospital of St. Paul, Student Health Service and other places enable us to accommodate ten or more additional students per year, but we obligate ourselves to fill only the thirty places in the hospitals first named. This is because we cannot guarantee the size of our classes. So far they have run approximately equal and we have had little difficulty in meeting our obligations.

THE GENERAL PLAN

This, then, is the scheme: in the last six months of their senior year most of our students live at the affiliated hospitals, are part of the resident staffs of these hospitals, help do the work of the hospitals and are responsible to the superintendents. They are taught by the university instructors who are on the staffs. They come to the medical school campus only twice a week for lectures. The remainder of the time they are at the hospitals. They learn by doing. The work is practical and individual.

Naturally, they do not all get the same work nor even the same kind of work. An attempt is made to have the services as well rounded and as thoroughly supervised as possible, but we do not think it necessary that all students be drawn through the same sized hole. All take the same final examinations.

Table 1 shows the schedules of services at the several hospitals.

SERVICES FOR THE STUDENT INTERNES

MINNEAPOLIS GENERAL HOSPITAL

Each student gets four of the following services, of six weeks each.

Gynecology	Contagious	Obstetrics
Nervous and Mental	Laboratory	Tuberculosis
Receiving and Ambulance	Surgery	Dispensary
Anesthetics and	Medicine and	Medicine and
Relief Ambulance	Relief Ambulance	Relief Ambulance

ST. PAUL CITY AND COUNTY HOSPITAL

Each student gets six services of one month each.

Rotation 1		Rotation 2	
Surgery	Laboratory	Surgery	Laboratory
Medicine	Eye, Ear, Nose, Throat	Medicine	Obstetrics and
Contagious	Gynecology, Genito-Urinary, Skin	Ambulance and Receiving	Tuberculosis Pediatrics

COMBINATION

UNIVERSITY HOSPITAL	GLEN LAKE	PHALEN PARK
Obstetrics, 1 month	Tuberculosis,	Orthopedics; Pediatrics,
Surgery, 1 month	etc., 2 months	etc., 2 months

MILLER HOSPITAL, ST. PAUL

Each student gets four services of six weeks each.
(1) Medicine (2) Surgery (3) Pediatrics (4) Eye, Ear, Nose & Throat

SCHEDULE ARRANGEMENTS: DIVISION OF JUNIOR AND SENIOR CLASSES

When this matter was under consideration, we discussed the length of time the individual student might spend in residence in a hospital as part of his undergraduate course. We agreed that six months, or two quarters, were as much as could be spared from the eighteen months, or six quarters, of the clinical course. Moreover, a more frequent change of junior interns would be detrimental to the hospitals.

Of course, if these students were to have the responsibilities of junior interns, there had to be groups on duty throughout the year. The problem, therefore, was to organize the senior class into two approximately equal divisions, with one six months in advance of the other. It was found necessary to make this separation at the beginning of the junior year.

Half the students from the close of the sophomore year proceed straight ahead for six quarters without any long vaca-

tion. (There is a vacation of four weeks in September.) The other half take two vacations of three months each (the regular amount). The first division, therefore, gets six months ahead. Thus, the filling of the student internship twice a year is rendered possible.

It thus results (a) that about half our students save six months on the medical course; (b) that we graduate classes twice a year, i. e., in December and June; and (c) that our hospitals are used for teaching twelve months of the year.

Our preliminary consideration also made plain that the contemplated student internship should be preceded by a clerkship of systematic and supervised character, where the student should get some experience in the methods of examination, history writing, laboratory tests, etc., We settled on six months for this period.

NEW EDUCATIONAL UNITS

We have, therefore, eliminated the junior and senior years as time units of education significance. Instead we recognize (a) an introductory clinical period, (b) an intermediate clinical period and (c) an advanced clinical period, each of two quarters, or six months, duration.

The introductory period corresponds to the first six months of the junior year. The systematic introductory courses in medicine, surgery, obstetrics and pediatrics constitute the largest feature of this period. We, therefore, speak of it as the "didactic period."

The intermediate period corresponds to the last three months of the junior year and the first three months of the senior year. The instruction revolves around the clerkships. There is a lessened amount of lectures. All the clinical instruction is at the University Hospital and dispensary. We speak of this six months unofficially as the "clerkship period."

In the last six months of the senior year the program calls for only six lectures a week, arranged on two afternoons. The remainder of the work is elective. The student internship is the elective chosen by most of a class. We, therefore, speak of this time as the "student internship period."

Table 2 shows the general arrangement of our curriculum for the clinical years:

TABLE 2. SHOWING HOURS PER WEEK CREDIT FOR COURSES CONSTITUTING STUDENT INTERNSHIP

MINNEAPOLIS GENERAL HOSPITAL, Dr. Henry Ulrich, Supervisor

Part I.	Examination and care of patients, 24 hrs.
Part II.	Medical rounds, 1 hr.
Part III.	Surgery rounds, 1 hr.
Part IV.	Obstetrics clinic, 1 hr.
Part V.	Clinical pathological conference, 1 hr.
Part VI.	Pediatric clinic, 1 hr.
Part VII.	Nose and throat clinic, 1 hr.

ST. PAUL CITY AND COUNTY HOSPITAL, Dr. A. R. Colvin, Supervisor

Part I.	Examination and care of patients, 26 hrs.
Part II.	Medical clinic, 1 hr.
Part III.	Surgical clinic, 1 hr.
Part IV.	Clinical pathological conference, 1 hr.
Part V.	Gynecological clinic, alternating with eye, ear, nose and throat clinic, 1 hr.

Students at the end of the sophomore year may choose Division A or Division B of the junior class, subject only to a rule that students with deficiencies may not register with the advanced division. So far, Division A has averaged about thirty students and Division B about forty.

The arranging of the vacations for Division B was a matter of some importance. The students did not desire to take six months straight. Therefore, they come back to school in the fall following their sophomore year, (three months behind Division A). For the fall and winter quarters the classes take many lectures in common. This saves duplication.

However, it is impossible for the students of Division B to get clerkships in the spring, as Division A is still in this work, and our hospital will not accommodate more than forty clerks at a time. Therefore Division B takes its second vacation in the spring.

This may seem unfortunate, or even, to the wool-dyed traditionalist, unnatural, but it has advantages. The students of Division B may make use of this quarter to remove deficiencies, get postponed bachelor degrees, pursue desirable electives, engage in research, etc. Many of them stay in school during the spring.

SAVING "LAME DUCKS"

I know with what opprobrium, bordering even on horror, many deans here assembled speak of the "lame ducks." Did it ever occur to you that a lame duck may be weak in the legs but have nothing wrong with his head? Anyway, I am obliged to chronicle that the four quarter system and, incidentally, our new arrangement of the curriculum constitute an orthopedic institute under which many "lame ducks" learn to walk without perceptible limp. Some of them, indeed—men with practical minds—leap forward under the stimulus of the student internship and take a place in the race along with the sturdiest members of their class. I know this is heresy and quite likely "lowers the standards" of Minnesota, but a Washingtonian instinct compels me to write it down.

Chart 1 makes this matter of classes, divisions and vacations clear.

So far about 170 students have graduated under the new curriculum. Over 90% have taken the student internship. I solicited an expression of opinion on a variety of questions from these 170 graduates. More than 100 have answered. I also canvassed members of the staffs of our affiliated hospitals, the superintendents of these hospitals, and the superintendents of certain hospitals at a distance who have had our men as graduate interns. The remainder of this paper will discuss features of the student internship in the light of the responses received.

SUPERVISION OF STUDENT INTERNS

A question of primary importance is the supervision of these students acting as interns. From the beginning we have given attention to the matter. One member of our faculty on each hospital staff has been made "supervisor of student interns." It is his business to see that they are instructed properly and to examine critically the work to which they are assigned, as to its educational value. All these supervisors are "part time" men. They are all interested in their work but cannot give it such close attention as the full time clinicians assigned to clerkship instruction give to that work.

The residents in the large municipal hospitals exercise direct

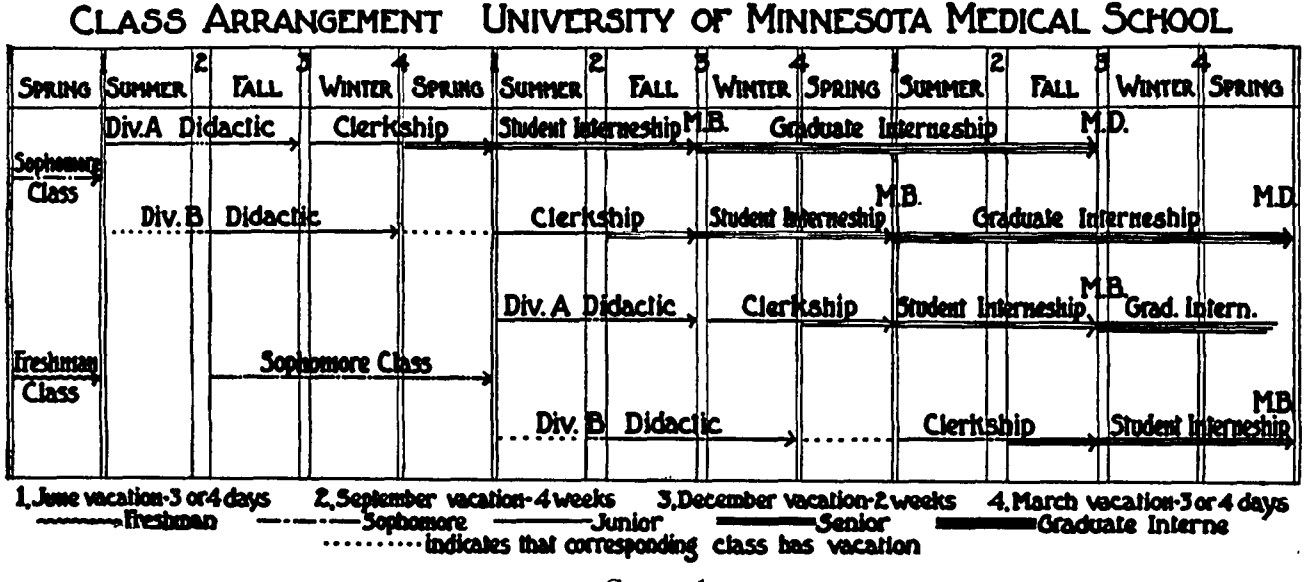

CHART 1

supervision over student interns in their respective services. This is especially effective at the Minneapolis General Hospital, where most of the residents are at the same time Fellows in our Graduate School. They, therefore, represent both the hospital and the university—an ideal arrangement.

	Introductory (Didactic)		Intermediate (Clerkship)		Advanced (Student Internship)	
Quarters	1	2	3	4	5	6
	Hours per Week					
Lectures	17	20	9	9	5	5
Laboratory	3					
Class Clinics	2	2	2	2	1	1
Section Clinics	4	4				
Dispensary Clinics	4½	4½	9	9		
Clerkship*			16	16		
Electives**	6	6			30	30
	36½	36½	36	36	36	36

Chart 2. Instruction Periods in Junior and Senior Years

*Clerkships: Medicine, 8 weeks; surgery, 8 weeks; obstetrics, 4 weeks; pediatrics, 4 weeks.

**The student internship is elective with a credit value of 30 hours per week.

The supervision, as a whole, has improved steadily but still leaves much to be desired. The answers to the questionnaire indicate that 75 per cent of the students consider the supervision adequate. Most of the remainder consider it "fair." A few say "inadequate." The replies of staff members are also divided, but a large majority think supervision adequate.

RESPONSIBILITY

One of the strong features of the plan is the increasing responsibility put on the student as he progresses. As a beginning junior in dispensary or hospital clinics he has no responsibility. As a clerk the student has some responsibility. The clerk's record in certain departments becomes the hospital record. As a student intern he has more responsibility; in fact, that indicated by the title "junior intern," by which he is known in the municipal hospitals.

Of course, it has been part of our duty to see that these responsibilities have not been too great for advanced senior students to bear. The hospital superintendents and staffs have also been keenly watching this matter. All teachers and officials whom I

consulted, except one, believe the responsibilities not too heavy. One staff man thought they might be "sometimes." Of more than 100 students educated under the system and replying to my question, four feel in a qualified way that the responsibilities may have been too heavy "in some cases" or "at times." I note that all but one of these four were in the first group, when organization and supervision were not so good.

On the other hand, 97 per cent are positive that their responsibilities were not too great. Several of the more thoughtful men comment on responsibility as an educational incentive. I quote: "We must begin some time;" "responsibility promotes better work;" "responsibility is a stimulus to study."

Personally, I feel that the gradual assumption of responsibility under our system is one of its strong features; that in the institutions where our students are trained the graded staffs of graduate or senior interns, residents and visiting men insure against the immaturity of the student intern group; and that when the student gets to the next stage, as graduate intern, he is the better able to handle the increased responsibilities of that position. Several superintendents of hospitals where our men work as graduate interns believe this last statement is true.

STAFF INTEREST AND TEACHING

It is vital to our system of student internship that the staff man under whom the individual student works shall be alive to his teaching obligations. This same problem is basic for a valuable graduate internship. You all know that far too often the intern has been regarded as a handy man to have around, a sort of sublimated servant. Only gradually is the relation of teacher and student becoming uppermost in the visiting physician's consciousness. We have to confess that staff interest and teaching are not so good as they might be, either in the student internship or in the graduate internship.

However, we have given attention to this feature of the problem and believe that a fair condition prevails. Seventy per cent of students say the staff showed sufficient interest. Twenty-five per cent aver that interest and instruction were good in some departments and poor in others. This is doubtless the real truth. Only five men were fully pessimistic, considering the

staff interest quite inadequate. The staff men themselves are not so confident. Only about half think that their interest in and teaching of the individual intern are sufficient. Let us hope that this becoming modesty bespeaks improvement in the future.

GROUP INSTRUCTION

As already stated, the entire student intern division has six hours class work each week at the medical school. In addition we attempt to have group instruction at the large hospitals. This has been hard to build up. The staff members have shown willingness; but complaints were common that the student interns were absent from clinics, the excuse being always that they had some hospital duty to perform. Nevertheless, the replies received indicate that many of the students regarded these exercises highly.

Beginning with the winter quarter this year the plan was changed, and each student intern was obliged to register for the group of exercises provided at his hospital. Roll calls and the prospect of final examinations are bringing about better attendance and more interest. Table 2 shows the group exercises provided at the Minneapolis General Hospital and at the St. Paul City and County Hospital.

STUDY AND GENERAL SCHOLARSHIP

It was feared that the nature of the work pursued by student interns and the fact that no final examination on the student internship is required might lead to a relaxation of scholarly habits; that the men might discontinue systematic study. In the opinion of a majority of the students themselves this has not happened. A fair number doubt whether the amount of reading is as great as earlier in the course, but excellent men think it is larger and especially that it produces better results. These last argue that the responsibility put on them stimulated study. As one said: "You were expected to know but often you didn't." Another said they "surely studied better than if they had stayed at fraternity houses and burned up the nights at poker."

It is evident that individuals varied widely in this matter, just as they do in more formal class work. It is further noticeable from their replies that their reading in this period tends to concern itself with the cases being observed and treated. Most of the staff men think the boys study pretty well. I take it that

they read a good deal as doctors themselves read: some much, some little, and usually as the day's work demands. A frequent answer to my question in regard to study was this: "There was room for improvement." Will any one deny that this could be said of all of us—or at least, the rest of us?

INCIDENTAL CONSIDERATIONS: SUMMER QUARTER

The Minnesota system of student internship involves the regular use of the summer quarter for medical study. Theoretically a student may take the traditional vacations, but he cannot hold a student internship nor get the best sequence of studies. Practically all students have attended one or two summer quarters. I canvassed the graduated men and women to see how they feel about this now that they are through with it.

SUMMER STUDY

Over 70 per cent said they could study as well in summer as at other times. About 15 per cent said, "No." The rest said "Nearly as well."

Practically the same ratios express themselves regarding the quality of instruction, the big majority asserting that it was as good in summer as in other seasons. I feel that it was not so good at first but it is now nearly or quite up to standard. What one loses by the absence of old and experienced men is gained, I think, in the enthusiasm of younger substitutes. Besides, we have a good proportion of the higher ranks on duty in summer. Minnesota is a good place for summer work, and some of our clinical staff ask to get away in winter rather than in summer.

CONTINUOUS ATTENDANCE

The Minnesota plan brings it about that half of the students, from the sophomore year on, attend continuously for nine quarters. Until they are student interns they get the usual short vacations between quarters and four weeks in September. As student interns they get only such short intermissions as the rules of the hospitals provide.

I, therefore, canvassed all who have been members of Division A as to whether they found it difficult or deleterious to health to study straight through the two years. Ninety per cent. say "No." A few found the life pretty strenuous, "difficult but not

deleterious," as one said; and three think their health suffered. Almost all (including two of the three) say they would do it again, the principal reason being that thereby they saved six months. Some say they got fat and thoroughly prospered in summer study. So you see it is a good deal like many problems in clinical research, you can make any kind of deduction you wish. I invite you, in current slang, to "roll your own" conclusion.

Many other topics might be discussed, but this paper is already long. I invite for those interested correspondence or personal conference, or, best of all, visits to our hospitals where the actual work is conducted.

SYSTEM WINS GENERAL APPROVAL

The proof of the home brew is the morning after. I am surprised at the unanimity of approval on the part of all who have partaken of this experiment. There seem to be few headaches or regrets.

In reply to my question as to "which is better for the student, the student internship or the system of group clinics previously in effect?" twenty-three faculty members doing the actual teaching say the student internship is better. One man thinks the group clinics better.

All our clinical department heads are in favor of the student internship.

Of the 105 students educated under this system who answered my questionnaire ninty-nine had the student internship and six took other electives or research in place of it. All the ninty-nine but three in the light of subsequent experience would again choose the student internship. One thinks he needed more didactic work and group clinics. One would prefer "the more scientific atmosphere of a clinic and a well organized lecture course." One says "a fourth year man needs more supervised work with instruction; gets plenty of practicaly work later any way."

Of the six who did not have a student internship two wish they had. The others are well satisfied with the work, in these cases, mostly research, which they took as a substitute.

ADVANTAGES

The following are the advantages of the student internship system set forth by various students and faculty men:

(1) Practical training; (2) graded responsibility; (3) gradually increased scope for initiative; (4) contact with patients; "ability to meet people;" (5) opportunity to see emergencies; (6) "better chance to use my own mind;" (7) foundation for senior (graduate) internship; "acquaintance with hospital methods and routine;" (8) "I gained confidence in myself;" (9) "better able to grasp ideas set forth in lectures;" (10) "stimulates work;" (11) "graded transition from theoretical to practical training;" (12) time saver, eliminating trips to distant hospitals necessary under old system; (13) learned to take good histories; (14) pathological conferences, with previous acquaintance with the cases; (15) practical therapeutics; (16) contact with good staff men; (17) "remember much better by seeing cases;" (18) after five and one-half years of almost entirely didactic work one needs a little transitional experience;" (19) "stimulates interest;" (20) enables a student to save half a year in his course.

To these I add the following:

(21) Makes use of hospitals for teaching purposes throughout the year; (22) makes each affiliated hospital responsible for an important part of medical instruction; (23) saves six months' expense for board and lodging.

CRITICISMS

While nearly all answered the question on the strong points of the student internship system only about one-third of these replying to my circular letter accepted the invitation to offer criticism or state deficiencies. The following are the most important:

(1) Supervision should be better; (2) too little group instruction and discussion; (3) lack of interest and promptness on part of staff. Too much of supervision and instruction left to senior interns; (4) lack of didactic instruction; no time for systematic reading; (5) lack of certain services. (This varied with the hospital and with the rotation the individual engaged in.) (6) Too much time on noninstructive routine, e. g., "history writing," "paper work," "physical examinations," "laboratory," "ambulance." (Some of these most teachers would account very valuable.) (7) Conflict of lectures at the University twice a week with hospital duties. (The municipal hospitals keep two

or three student interns on duty on lecture days.) (8) Distraction of didactic courses at the University; (9) no library facilities; (10) "lack of system;" "lack of organization of hospital staff."

It goes without saying that those in charge of the work would acknowledge all these criticisms to have some foundation. Many of them are inherent in any form of clinical teaching. However, we know that on the adequate fulfillment of some of the suggestions depends the success of our plan. Such matters as proper supervision, good group instruction, real personal interest by the staff, and incentives and facilities for the growth of scholarly habits are immensely important. We hope that even now they are fairly attended to and that we may gradually do better.

EXPENSE OF SYSTEM

We have not spent much money on the student internship system. The staffs of the municipal hospitals give their services. All the hospitals have to be carried on in summer as well as in winter. The advantage of making use of their facilities for the full year more than compensates for any extra expense.

In the didactic work some duplication is involved. We are enabled, however, to make use of more men and thus to try out the abilities of a number of teachers from the standpoint of lecturing. We usually pay $10 a lecture for courses given by men not on regular salary.

There is some tendency of our regular men to stay on duty in summer and take their vacation in some other quarter.

In all this I am speaking of the student internship and other work of the clinical years. The duplication of laboratory courses and carrying on of our two-classes-a-year principle down into the preclinical departments would add considerably to the budget. We have not attempted this, although we give a good deal of science work in the summer quarter.

CONCLUSION

Finally, it may be confessed that the student internship, like other babies, is not entirely "original." A geneology might be established if one cared to take the time. Some medical students

in many schools live in hospitals and acquire uncredited experience. This is especially true during summer vacations. The London student "walks the hospitals." In some teaching hospitals the "clerk" is responsible for certain duties. The student internship at Minnesota has features in common with all these. Its originality consists in organization, supervised instruction, and a definite place in the curriculum.

DISCUSSION

DR. JOHN M. DODSON, Chicago: The question of students taking an intern year of supervised practice in a hospital, which is the only place where they can get it nowadays before they enter on the practice of medicine, is settled. Every student should have an internship except those students who are planning lives of teaching and investigation, and it is a question whether many of these would not be better off with hospital service. I think the laws in those states which now require internships should be so modified as to permit the substitution of a year of advanced research work in one of the departments for those students who elect to go into a life of that sort, otherwise we shall cut off, as we have already, very seriously the supply of men for teaching the fundamental branches. It is getting almost impossible to secure men who will continue in the teaching of anatomy, physiology and the like. The question, therefore, is, how shall this internship year be administered? Shall we leave it as it was in former years to the hospital itself? This would aid a great deal if all hospitals were as well conducted and eager about this matter as a few of them are. One of the principal advantages and purposes of this method is to secure greater uniformity of opportunity for interns to get service in several hospitals. To do this, somebody besides the hospitals must supervise this year, and two possibilities are open. Shall it be supervised by the state board of medical examiners in those states in which the intern year is required for licensure? All are agreed that this is not properly the function of the state board of licensure. They are not medical educators primarily; they are not in touch with the hospitals. If it is to be supervised at all, it must be supervised by the faculties of the schools from which the young men and young women came. In 1905 Rush Medical College decided to make the internship year a requirement for graduation. It was first offered as an optional year, with the intention of making it compulsory in the future. The class of 1918 was the first class to take the fifth year. The regulations drawn up for the control of the intern under the direction of the hospital and specifying the duties of the faculty as long ago as 1905 have remained substantially unchanged from that time to this. Our plan of administering it differs materially from that in operation by Minnesota and California. The students of the senior class find their own hospitals, and we believe very strongly that this is a much better plan. To enter into arrangements with any number of hospitals and say to them we will supply you with so many interns a year if you give us the places, means you must dictate to the student where he shall go, at least in part, and it is curious psychology on the part of the student that he will enter a hospital willingly, it may be a rather poor one, if he selects it himself, and may resent going into the best hospital that you

may select for him. Students select their own hospital, the sole provision being that it must be on the approved list. Although our approved list is a purely tentative one as yet, the student who desires to go into a hospital now on that list is requested to make the fact known to the fifth year committee, and the hospital is then investigated. A student fills out a blank with hospital he has selected and when the service begins. When he enters the hospital, the superintendent is communicated with and fills out the blank to the effect that John Smith has entered the hospital on such a date in such a service, the particular service being designated, and the service will terminate on such a date. Each student is placed under the immediate supervision of a faculty supervisor. That raises another interesting question. We are trying out the system of having a large number of members of the faculty in touch with this work. Each member not having more than four or five students, most of them only one or two. In so far as possible the member of the faculty who supervises the intern in a distant hospital, say Los Angeles City Hospital, takes all supervision of the interns going into that institution, and that gives him an opportunity to become familiar with the institution, to know the members of the staff, and to feel better qualified to speak on the work of the intern. He is supplied with blanks on which he makes a report to the fifth year committee every quarter. The student is required to make a report of his work at least once a quarter. In hospitals outside of the city, we have appointed students resident supervisors. We have found in most hospitals where our students go numbers of graduates of our own school who are interested in the development of this work, and who have given a great deal of attention and time to the careful supervision of its students. At the end of the senior year, the student receives what we call the fourth year certificate, setting forth the fact that he has completed four years of formal instruction and is now prepared for internship. When he has finished the intern year, if the reports are favorable, he is recommended to the faculty and trustees as being entitled to receive a diploma, and we have added this wording to the original diploma, otherwise the diploma is not changed, "this certifies that the student who possesses this diploma has finished his fifth or intern year in a hospital approved by the college," so that the exact facts are set forth on his diploma.

As to the approval of hospitals, we have found the list of the Council on Medical Education and Hospitals of the American Medical Association very helpful, but we are securing in our school a volume of information of a quite different type that can be secured in no other way, and that is, the testimony of the interns themselves. We ask each intern after he has served a year in an institution outside the city to write his impressions of that hospital, not so much about its equipment, its laboratory facilities and all that, but his impressions of the staff. Are they attentive to him? Do they supervise and direct his work carefully? What criticism has he to offer? These letters go into the files for each hospital and future students seeking internships have free access to these files. They can find out just exactly what their predecessors found to be true of these hospitals, and with very rare exceptions the testimony of the students received in that way is taken at its face value and as evidence of good faith and good judgment. Once in a while you can read between the lines that the intern has had some trouble with some member of the staff and he has "got it in" for the hospital, but that is usually readily detected. When such criti-

cisms are made we have communicated with the superintendent of the hospital or a member of the staff who is a graduate of the school, regarding the criticism that has been offered.

One of the most gratifying things in our experience has been the response of hospitals to such suggestions as these. They are more than eager to make their equipment, their facilities, their work and the care of the members of their staff to this service the very best possible. In the first place, they realize that it the best possible way to improve the hospital as a place for the care of the sick and injured, namely, they have to have interns.

Medical schools under present conditions have decidedly the whip hand because there are not enough graduates of medical schools in this country to fill the internships that are vacant.

One of the great advantages of the plan is that we hold interns to their contract unless there is a good and valid reason for violating the contract. The minimum essentials which we have drawn up state explicitly what we expect a hospital to do for the student. If the hospital does not do these things, it is violating its contract with the intern, and we say frankly we shall support the intern in deserting the hospital and of leaving the institution if reasonable conditions are not met. Previous to the requirement of the intern year, it was a very annoying situation to have an intern giving his first year without having those requirements met, and it is a singular thing how frequently a man, otherwise apparently sound in his makeup, will regard a verbal or written contract in connection with the hospital as so much paper, absolutely worthless. They do not do it any more. On the other hand, if the hospital does not give the student fair treatment, if the service is not what it was represented to be, we have supported the intern in leaving the institution.

I quite agree that didactic instruction is not what the intern wants. The question we are frequently asked is: Do you want us to give lectures or formal clinics? And the reply has been: Not at all. Students have had four years of that, and what we want is that they shall have the utmost freedom in their work under careful, close supervision. If an intern does not already know how to make a complete, accurate and prompt history, he should be required to have a thorough physical and laboratory examination, and record his findings so that his mistakes will be pointed out to him. I also agree that this is a matter that should be taken up with the state boards, that a continuous service is much better than a rotating service, not only for the patient and the members of the staff but for the intern himself. A good grade of medical and surgical service is not enough, and I would add this further proviso that the medical service should always precede the surgical service. A man may be ruined very quickly if he does not write good histories, but if he is taught how to do these things in the beginning, he will do it well for the surgeons later on. I really think every intern should require medical service first, then surgical possibly, finishing it with some advanced medical work. How is a man going to get an all around view? With very few exceptions, he can take a single year of continuous service following an additional year on an outside service, thus getting a full survey of the field. For an intern to be bobbing around on one service for six weeks or three months, then leaving it when he is beginning to get anything out of it is to imply an absurd arrangement.

We had two students expelled recently from a hospital because the people did not like them. We tried to ascertain to what extent they violated the regulations and how much they ought to be penalized. We have tried to make arrangements for them to go into another institution, reserving our decision as to how much penalty shall be imposed. It takes time on the part of the faculty supervisor to do this, but it is worth while. The intern year is by far the best and most important of the student's career. If he is carefully directed and supervised, the intern year can be made of very great value. On the other hand, if it is indifferently supervised or not supervised at all, it can be almost worthless, as has often been the case.

DR. FRANK BILLINGS, Chicago: The proposition which Professor Lyon presents as having been put into practical operation at the medical school of the University of Minnesota is very interesting. Last summer I had the opportunity to see something of its workings. We had an opportunity there to observe the organization of these hospital staffs in the two institutions and to learn something of the regularity of the attendance of the staffs and of the provisions made for these student interns. We had an opportunity also to talk to the students themselves. I was a little disappointed in some things. The superintendent of the General Hospital at Minneapolis made the statement to us that the attending staff had no fixed time for attendance, and we were there for three hours one afternoon and saw no member of the staff while we were there. Therefore, the organization of that staff as represented by the activities of that day from the statement of the superintendent was not good for such work. In other words, the supervision of the student interns was not altogether good. The students in the General Hospital at Minneapolis reported that they liked the work. They had assigned to them certain patients. They were obliged to make the examination, physical as well as laboratory, and they made some complaint that they did not have assistance. I did not believe that sort of complaint was justified because to my mind it is a pedagogic principle in such instruction that if a student is trained in advance to use his brains and hands, he ought to work out the proposition alone, and in that connection I think we have advanced too far in petting students too much. They want us to help them out, instead of going in and working out their own salvation as pedagogic principles call for it. At the St. Paul City Hospital we found the supervision better. There we found members of the staff who knew nothing of our coming, and we found the work of the students themselves was supervised better than at the other institution. This is not really an innovation, but, as Dr. Lyon has said, carrying over the clerkships of the junior year into the senior year, with a longer residence in the hospital, and if he gives, as he states, sixteen hours per week for two quarters in clerkships in the junior year, he gives an opportunity for longer service as clerks in the hospital than most of the institutions give even that early, and then add to that the provision for another two quarters, and these student interns get a drilling in methods of recognition of disease, both the physical and laboratory examination, that is certainly practical, and if properly supervised and carried out must be efficient. I would like to ask Dr. Lyon how this works out in this first course. I know that the licensing boards in some states require four entire years in residence, and this scheme calls for six quarters which can be completed and the M. D. degree granted within three

years' time; whether if that were known the licensing boards in some of the states would recognize graduates of the University of Minnesota Medical School as qualified for examination for licensure, or whether the licensing boards would recognize graduate internship in an affiliated university as a time residence in medical education. That is a practical point that should be settled.

Nothing has ever been offered in medical education that is better than the clerkship. The difficulty lies in the clerkship during the senior and junior years. The curriculum is so crowded that it gives no opportunity for the clerk to work in wards; he does not have more than one or two hours available a week in which he can go into the wards. A fixed schedule for lectures and clinics will take this from him in spite of everything that can be done. But if this clerkship in the senior year could be made available, stating the number of hours the student intern shall have, say thirty hours per week, even if one-half or two-thirds of that time could be made available during six months or more, or if they would do as Osler arranged to do at the Johns Hopkins, namely, for every student to spend three months in the clerkship in medicine, the same amount of time in surgery, and the same in obstetrics, it would give the student intern an opportunity to recognize disease, to watch the development or evolution of disease or its cure. There is nothing better than that. We have crowded our curriculum with clinics and lectures to such an extent that there is no available time left for the student clerk in the ward. If the student clerkship cannot come back, you can adopt some plan similar to that which is now in operation at Minneapolis, and it will be a good thing.

As to internships, I think those of us who finished our medical education in residence with an additional term as an intern, know the great value of it. If the period in residence is so weak and deficient that the student must have an intern year to educate him, then it is all wrong. If you will give the right kind of education in residence for four years during which the student shall be taught to use his brains and his hands, to handle the instruments necessary in making a diagnosis and of treatment generally, then an internship is of the greatest value to him, then it is a highly useful and very necessary part of the medical curriculum.

The method of selecting hospitals for interns is a difficult one, and the large number of hospitals all over the country that are improving the service they give the public is one of the problems ahead of us, and the medical profession should meet it and make it just as much a part of our problem to thoroughly educate men, and unless we do offer some solution of that problem and enable hospitals who need interns to get them, then there is going to come up in this country the substitution of the intern by technicians and others.

Dr. George M. Kober, Washington, D. C.: As long as internships are desirable they ought to be taken before students become doctors of medicine. I am a thorough convert to the belief that it is extremely desirable that no man should receive the degree of Doctor of Medicine until after the completion of an intern year. The average medical student will do his duty more conscientiously and more thoroughly when he is under strict supervision, when he has a certain degree of responsibility. He knows that it is necessary for him to do his work faithfully and efficiently

in order to receive the medical degree. I believe thoroughly in clinical conferences in which the student, particularly the senior medical student, participates in the teaching of the class or a section. One of the greatest joys of my life has been to see young senior medical students presenting carefully prepared case histories, defending their diagnoses, if right, and if wrong they are set right. It is stimulating to the whole class to witness and to participate in that kind of instruction.

DR. JOHN A. WITHERSPOON, Nashville, Tenn.: No one would conclude that the intern or hospital year is not necessary or at least is not a great advantage ot any young graduate. I have been concerned with only one thing and that is the age at which our young men are being turned out to practice medicine in this country. Many men are from 27 to 29 years of age before they begin the duties and responsibilities of practice. How to get these young men into professional work earlier is important. In regard to undergraduates: During the war necessity forced us to put senior and even junior students into hospitals. We had no interns. Many times during the epidemic of influenza in Nashville, when we had great government works there with sixty thousand employees, a hundred and fifty men were dying daily, and we had to send out students as nurses to help out. That led us into furnishing undergraduates for hospitals and we have had to keep it up ever since. In one of our large hospitals of 300 beds so much surgery is done, out of all proportion to medical work, that our undergraduate interns do not get proper instruction in medicine. Just about the time they are ready to make their rounds with some of us in the medical service they are called to the operating room to assist the surgeon. It is an unfair advantage. The intern ought to take medical service first, because we know proper history taking is one of the greatest factors in diagnosis. I have been impressed with the fact that the medical man demands a much better history than the average surgeon. Therefore, I think it is well that he should have, if possible, an equal distribution of the work on the part of interns, and let them have their medical service first.

DR. I. D. METZGER, Pittsburgh: I have been much interested this afternoon in getting the reaction of college men on intern training, and representing a board which has had experience for eight years in intern training as a requirement before the applicant may take an examination, I think I can speak with a little freedom of our experience. Pennsylvania thinks intern training should be an experimental training, the training of an apprenticeship and nothing more. It, therefore, insists that a man shall have had his full medical training before he enters on an internship. Pennsylvania cannot look kindly on the plan submitted by the University of Minnesota. Knowing as we do the type of intern training and undergraduate training that is received in the hospitals, we cannot think that that training is equal to the training given by regular undergraduate work in a college. The statement was made that rotation service is not a good service. It is not adequate, especially if it covers but one year's work. We think that one year of intensive work under supervision in a hospital is of great benefit to every intern, but we question whether the work of an intern should take him away more than a year from his medical practice from which he can get some remuneration. The state authorities should have control of the hospitals, and the hospitals should be responsible to

the state authorities. If the state says an internship shall be required, the state has a right to demand the type of internship given and has a right to supervise the hospitals of the case.

DR. T. J. CROWE, Dallas, Texas: State boards are interested in the intern year or the five year proposition. According to the Minnesota plan, if a man is graduated in three years with the degree of M. D., he would not fulfill the statutory requirements of many states that require four full years. Another point that may be raised in connection with the intern year is that if it is to be made a statutory requirement, a point which concerns the state board is the question of jurisdiction. In other words, can the University of Minnesota delegate to the Charity Hospital of St. Louis the function of applying this fifth year? Would the laws of the state of Texas or of California sustain that delegated function? Was that man a graduate when he left the medical college or when he finished his training in the City Hospital of St. Louis? That is a question state boards will have to settle. It seems to me, there ought to be some fixed idea that state boards may have to take into consideration the adoption of the intern year. In our state we are going to make this intern year a requirement in 1925, but at present we do not know just how to put it on.

DR. E. P. LYON, Minneapolis: I made a note of two questions that have been asked, and the first relates to the legal aspects of student internship, meaning by that, I suppose, whether the M. D. degree which is received at the end of three years and one quarter after the beginning of the freshman year is legal. Before we put this plan into operation I consulted the dean of our law school. We looked up the statutes of many states, and almost all of them read that a man must have attended four annual sessions of eight or nine months in separate calendar years. It was the opinion of the dean of our law school that you could not get two nine months' sessions into one calendar year. If you mean by a calendar year from January to January, you do not do it now. You do not obey the law now because a freshman goes from October to June. We require that a student shall attend twelve quarters, and twelve quarters of four years in the collegiate sense, and no two of these are in the same calendar year. It is true the student continues to be registered at the University of Minnesota, and while we would not have any analogies in medical education, we would have to abandon analogies in that part of the university for a student pursuing his work in absentia. A graduate may spend his time in Rome or anywhere else for the work he needs, and on that analogy a man should be considered to be in the university, and not pursuing his graduate internship in St. Louis, Los Angeles, or any other place. He is still under our supervision; he is still registered with us. Therefore, I believe that our arrangement complies entirely with the law. What about these laws? They date back, as you know, to a time when there were medical schools trying to graduate men after two years of attendance, or none at all. In those days there were diploma mills of various kinds. While the laws must be obeyed, they ought not to hamper educational progress, and if any one should say anything here that this is not a good thing, the laws should be amended. Our state board has accepted these men to take their license examination.

I am not sure whether the representative from Pennsylvania would not look favorably on student internship or graduate internship after

knowing the facts in the case. Doubtless he thought that these student interns were no longer connected with the university. Remember, these student interns are affiliated with the university. The university has contracts with them. They are just as much a part of the university as the work on our campus. Moreover, under the old plan what happened? During the last half of the junior year one-half of the men would have been two days at St. Paul and two days at Minneapolis, and so on, except that they were divided and spent time on the street cars. They are being taught by the same men in group clinics, instead of living there. No criticism can be brought on the ground that these student interns are not under our direct charge and supervision.

I would like to have incorporated in the record an answer to the statement made by Dr. Billings in regard to the Minneapolis General Hospital. It was unfortunate that the committee making a survey of our school, of which Dr. Billings was a member, happened to be there at the time it did, because everyone who is familiar with the circumstances in that hospital knows that it is conducted as the rest of them are. The attendance of the staff members is as regular there as it is even at the University Hospital where the men are paid. The superintendent, in speaking to the member of the committee and saying that the men on the staff had no regular hours, did not mean to say they were not regular in the attendance. What he meant was the men did not come regularly at 9 and stay until 12, or something of that sort. They are regular in their attendance. I got the idea from the report of the committee that they felt there were no fixed hours for group instruction. The superintendent was not speaking to them at all at this time, and if you look at the schedules you will find that the juniors were assigned to hospitals and the student interns had fixed hours, and the staff meets them for group instruction, and those hours are as definite as any of the other program hours. I speak of this because it stirred up quite a little teapot steam in our neck of the woods, and I thought it necessary to correct a wrong impression that may have been conveyed by Dr. Billings' otherwise excellent remarks by putting this into the record of how the committee got a wrong impression in this particular case.

PROFESSORS AND CLINICAL PROFESSORS OF CLINICAL SUBJECTS

CHARLES P. EMERSON
INDIANA UNIVERSITY SCHOOL OF MEDICINE
INDIANAPOLIS

Our judgment of the efficiency of factory or university depends in large degree on what we think of its finished product. The manufacturer understands this, but those in charge of medical education when planning the so-called standardized medical courses, sometimes forget our end product—the medical graduate. Indeed, our chief concern seems not so much to be his welfare as our success in balancing conflicting departmental ambitions and testing out new theories of pedagogy, with the result that we put him on the market not only unfinished but also, perhaps, badly scratched. Our plea today is for a better appreciation of the clinical years, and the questions we would ask are: should these, in truth, be clinical years? and if so, What are the considerations which should direct us in our choice of the men to direct the clinical departments?

This problem lies at the very root of medical education, and we cannot avoid expressing our intense disapproval of any system which farms out our students for their clinical instruction to any hospital staff that is not too bad in quality. A student's medical education begins in the wards and dispensaries; the premedical and preclinical years are but the preparations for this. All that is learned in the laboratory must be relearned, reproven, confirmed and corrected in the wards. Much of our medical progress is suggested and charted in the experimental laboratory, but that is not where medical progress is actually made. And the same is true of medical education. The more elaborately, therefore, we plan our scientific courses, so much the more elaborately and cautiously must we plan our ward teaching where all this science must actually be translated into terms of human life. That is, the better the teachers of the preclinical sciences the more carefully must we select clinical teachers who can rise to each added responsibility imposed on them by the laboratory men.

The chief object of a medical school is to train practitioners of medicine, surgery and the specialties. This granted, it is the

clinical years by which a school is finally judged. It is in order that they may study with clinical men that our students toil through at least four premedical and preclinical years. Whom shall they find there? A science speaks for itself to the students but a clinic is the man himself in action and the student will learn from a clinical teacher much that he little intends to teach. His personal attitude toward and dealings with his patients will betray to his students his ideals, his intellectual honesty and his professional integrity far better than can his spoken words. What he unconsciously teaches and what they unknowingly learn will actually influence their character as professional men and women far more than can the ever changing medical lore which he discusses with them. Farm out your students for the preclinical courses, if necessary, but plan the clinical years with earnest solicitude; for one plausible but lowminded clinical teacher can debase the high morals of almost a whole class.

The present sharp distinction between premedical, preclinical and clinical subjects is quite artificial. That was a very shrewd and efficient device to correct the pathologic conditions of medical education of thirty years ago. It was a temporary expedient and as such we owe it no loyalty now and, its mission accomplished, the sooner we abandon it the better.

In that reorganization of medical faculties which began about fifteen years ago when distressed medical schools, like tempest-tossed ships, two or more often tied together, strove to find haven in some university, an inexperienced university trained dean, appointed to head a teaching force composed of the recently combined faculties of previously hostile medical schools, was very likely to find that he had on his hands a jealous, belligerent group of, let us say, one hundred professors and eighty of all other lower ranks, very few, if, indeed, any of whom deserved the title "professor," if judged according to the same standards which obtained in other departments of the university, and yet some of whom in their former proprietary schools had proven themselves quite successful teachers. How easy it was to soothe their feelings by calling them "clinical" professors and then search for men of as different a type as possible to head these departments. What a pity that a most honorable title should have been thus abused!

In that stormy evolution it was the professors of the pre-

clinical subjects who saved the day. They, well trained in their subjects and with high university ideals, might well look askance at the work and standards of the clinical men, the great majority of whom could never have passed a student's examination in any premedical or preclinical subject, and yet who were practical. successful and powerful men in their communities. Nevertheless, and this surprised some university men, not a few of these uncultured men had had splendid success as educators in the medical field. These preclinical men acted wisely. They raised the standards for entrance to medical schools, thus eliminating that dangerous group of boys coming direct from high schools; they developed their own departments to a degree of excellence which is remarkable when one considers the very inadequate budget allowed them; they bravely weeded out the doubtful students and sent into the clinical years boys who knew what good teaching was and who would demand professors whose excellence should improve each year with their growing ability to appreciate it. Surely, those schools which on academic grounds demanded the wholesale resignation of their clinical faculties sowed the seeds of future opposition which they could ill afford later to reap.

It would seem to be a much better plan to assign to poorly equipped "professors" a fair amount of ward or recitation (not lecture) work and leave their elimination to the students, who have convinced many a one that he was "too busy to give his time to teaching." And, finally, the preclinical men have endeavored to bring to the clinical chairs men who, from the university point of view, are worthy of the title "professors;" men with a wider reputation than their own state; men who have and are advancing their subjects; men who can win election in the national societies with limited membership; but, especially, men whom the students will respect; whose teaching will build in the students' minds a superstructure worthy of the foundations which they themselves so carefully have laid. But what superstructure have they in mind? Can teachers of the sciences judge wisely of clinical teachings? The universities certainly succeed in organizing good faculties for the scientific branches but the present status of the clinical department raises doubts in the minds of many that they are succeeding brilliantly here.

Is it, then, difficult to find men who in university circles would

compare well in their clinical field with the professors of the pure sciences in theirs? It may be hard, but it certainly is not as difficult as superficial observation would suggest. Indeed, the problem may not be to find such men but rather to tie them up in a university department. If so, the fault is in the university and is one which dates back to the Middle Ages. Discredited and banished from other spheres of human activity, this false philosophy, that the excellence of a learned man is to be judged by his intellectual attainments, not by his emotions, still flourishes in our centers of learning. We suspect that the ideal man for a professorial chair of clinical medicine would be unhappy in the university medical school. Why is Paul Harrison in Arabia? He is one of the promising graduates of his medical school and, we are told, two of the greatest universities would gladly have held him. Why is Edward Hume in China? Why is John Caulk in Siam? Why did Hall die in Pekin? Why are Houghton, Watson, Dunlap and others not here? You can add other names to this list. Some of these were the brilliant men of their classes, good teachers and good research workers. Indeed, we believe that among the medical missionaries is a higher percentage of men of fine promise as university men than among their classmates who stayed at home. Are these men commercial? Emphatically, No! They work full time on a very small salary. Why cannot the universities make the home field equally attractive to more of their brilliant students?

But, let us repeat: What are the proper qualifications for a professor of clinical medicine? You will agree with me if I name first a thorough training in the scientific branches of medicine, and a proven ability as a laboratory research worker in at least one of those scientific fields. The professors of clinical medicine must of necessity have this. The laboratory is the lever which has pushed medicine forward and it must continue to push, for if it stops, medicine will soon again become empiricism and formalism. Or, to change the figure, the stream of medical progress, driven by laboratory research, flows swiftly, and only he who in the laboratory learns how to swim can hope to keep intellectually alive. Each student should do some research work since each of his future patients will to some degree be a research problem and only the man with a little

research skill will recognize and meet the individual needs of his cases.

But are intellectual brilliancy and proven research ability, essential though they are, enough? Certainly not, although according to common practice they would seem to be. The art of medicine also is necessary. This is possessed by some as a natural endowment, but not by all, and all can develop the gift they have by training. The art, not the science of medicine, is what the students look for in their clinical professors. They have struggled through at least four years of college and medical school work in order finally to have the privilege of attending clinics where the art of medicine reigns.

But there is a third quality just as necessary in the professor as are the two mentioned; possibly just a little more so. I refer to that sympathy for the patient, that love of fellowman which prompts one to dedicate all his powers to this profession regardless of any earthly reward. The professor may be splendidly scientific and yet be a brute; he may be richly endowed with all the art of medicine and yet be a quack; he should have all three and until the universities appreciate all three, their Paul Harrisons will go to Arabia and China where they can work unselfishly and happily on a pittance. But this is not all. You cannot deny that a spirit of service is considered by many university men as a distinct disqualification in a candidate for a university position. If this is general, then the sooner we divorce medical schools from universities the better, for they would, indeed, have little in common.

But let us return to our problem. Some preclinical teachers would seem to believe that clinical medicine is merely the application at the bedside of the preclinical sciences, and that the student who has mastered these sciences has already actually covered a definite and a considerable portion of the field of medicine. These same teachers, however, demand considerable premedical science as preparation for their preclinical courses, and they certainly refuse to grant that these overlap. We, on the other hand, would maintain that while the man well trained in the preclinical sciences can develop for himself a much wider and firmer grasp of clinical medicine, yet there is no real overlapping of these two fields. The preclinical subjects fit a student

for the clinical field, but his entire medical education is received in the ward.

Others would appear to be even more radical than these, and consider ward work as lower in grade than laboratory work as a distinct step downward. We have even heard them say in effect "Do your laboratory work well for six years and you can get all the clinical side of medicine worth having in six months." Some would even use the analogy that just as the well trained electrical engineer could, did he so desire, easily get a job in a municipal lighting plant, so the Ph. D. in experimental medicine could easily practice medicine. We grant that the wards have seen very poor work, but we believe that the day has come when our best men will find there their best oportunity for study, research and service. Why is it that our preclinical teachers try to divert the better students into laboratories for research? Why do some medical schools even propose special buildings for medical research? What greater laboratory can there be than the ward? What higher reach can science attempt than the relief of human suffering? Why are the laboratories not the training ground for the ward rather than supercilious rivals?

Are these citicisms theoretical? Can we point to any real evils which have arisen from the system we have presumed to criticise?

Let us study critically the output of our medical schools, our recent graduates. It has been affirmed by older men in medicine that their young assistants and hospital interns show a definite lack of sympathetic interest in their patients, that they are rather coldblooded propositions in their early practice. Of course, some may protest that "even if this is true the schools are not to blame." But granting that this is no fault of ours, if it is true, should we not make carefully planned efforts to counteract it? It is hard, indeed, to see how the present strong emphasis on the laboratory side of medicine and the present tendency to disparage the value of ward work can do other than tend to make our students "cold blooded propositions." Would that we had a few Humes on our teaching staff to cure this evil.

Second, it is inevitable that too great emphasis in the schools on laboratory work should discredit the value of the art of medicine and lead later in the practice of medicine to too great

emphasis on laboratory tests. The hard work necessary for the development of the art of physical diagnosis will never be endured if the student doubts its value. And yet physical examination is and always will be fundamental in diagnosis. How many of our recent graduates send the sputum of every patient with a chronic cough to a laboratory and conform their diagnosis to the reports which they receive? How many try to determine the physical condition of the lungs from roentgenograms of the chest rather than by physical diagnosis? How many of our recent graduates send the blood of all their patients with doubtful conditions to the serologic laboratories and wait for the reports to come back in order to tell those whose reports are positive that they have syphilis and those whose reports are negative that they have not? All this is criminal malpractice! The pathologic, roentgenologic, serologic, et al, laboratories give us splendid assistance but they cannot do our work for us. They are ladders, not crutches. They challenge us to develop our art of physical diagnosis to a much higher grade of excellence and this means careful ward teaching and hard work during the student days. One leader has said that a medical man showed his good training by the use he made of the laboratories. Yes, but he said "used" not "served," not "obeyed." He is a lazy, badly trained man who will ask the laboratories to do his work for him and cold hearted, also, for the more interest a man takes in his patients the more will he use, but the less will he depend on, the laboratories and the more will he rely on his personal examinations.

And, finally, is it not probable that the relatively strong emphasis laid during school days on laboratory tests and research work and the relatively little emphasis laid on ward work explain, in part at least, the flood of vaccines, serums, nonspecific proteins, internal secretions, vitamins and other biologic products with which manufacturing plants have deluged this country? The ease with which our graduates are persuaded to prescribe this stuff is to my mind sufficient evidence that our medical schools need fewer "professors" and more "clinical professors" who consider the wards as the most sacred ground on which the medical student can tread. The great mass of laboratory research may suggest much but it proves nothing for man. The shortcut so often made of test or therapeutic measure from laboratory to general practice is one of the greatest medical evils

of today and can be checked only by that system of education which develops ward work as the highest expression of medical pedagogy. This means clinical teachers who have all that the preclinical teachers have and still more: the art and the heart of medicine.

DISCUSSION

DR. A. PRIMROSE, Toronto: There is a good deal of discussion as to the present methods of organization in clinical teaching, and if we are to have the ideal clinical teacher which Dean Emerson has spoken of, we must begin now to train men for these specific jobs. I would like to mention a scheme which we have inaugurated in the University of Toronto. This session is the beginning of our reorganization of the Department of Surgery. Looking forward to the training of men for clinical teaching, we recognize that the best way to develop clinical teaching is to put before the junior men general practice or the practice of a specialty, and recognize that their destiny is practice and not teaching, the object being that when a man gets into practice he will be available for a position on the university staff as a clinical teacher. We have men trained who will proceed to a higher degree in medicine. They will be capable of taking examinations for that higher degree three years after graduation. Let us suppose that a man who has the requirements proceeds immediately after graduation in the ordinary routine of hospital service as a junior intern. He rotates between the services. There is nothing peculiar about that particular year. After that year, however, he will be qualified as an ordinary resident. We have examined three men of this type at one time in medicine, gynecology and obstetrics, and surgery. A man not qualified as a senior resident must take one year in a laboratory designated for the purpose and approved by the instructors. It may be pathology, bacteriology or biochemistry. He must have one year of intensive training during which he is doing research work. He is then eligible for a position as senior intern, he is a fellow in his department in the university, and receives a salary of a thousand dollars a year. This man is eligible at the end of three years for postgraduate work, to take a higher degree in medicine, such as Master in Surgery. After that we have not done with such a man. We are still looking forward to the training of men getting into practice, doing clinical work, who are eligible for the University Hospital when they are not capable of supporting themselves. We appoint such men and give them $2,500 a year as full time men in the wards. They are allowed to do a certain amount of private practice. A man in surgery, for instance, can do private practice. In the first year he is trained so that during that time he has facilities in the hospital and laboratories to do research work. He goes into the wards and takes part in the teaching there. The object is to train these men in specialties more particularly. In the meantime, we have provided training for such men in medicine, surgery, gynecology and obstetrics. There is no definite provision for the specialties. Our opinion of such a scheme will in the future give us a hospital staff composed of men who have the requisite training along the line Dean Emerson has suggested. It is a scheme which may be put in operation today, which will not be fully operative for ten years' hence, when we hope the hospital staff will be manned by men who have the

specific training of the men in general practice, in the practice of surgery or medicine, and who can take their place in the hospital wards.

The other point which I wish to allude to is this: We have recognized that in the premedical sciences and in the wards we should have full time men of good training, who will be placed in the different wards. For instance, take the Department of Medicine in the University of Toronto. In the wards there is a trained chemist, full time, at $2,500 a year. There is a trained physiologist who is paid $2,500 a year. A certain amount of time is allowed for private practice. There is also a third man, a bacteriologist. That system of bringing the premedical sciences into the wards in contact with the clinical teaching is excellent because it helps the contact sciences and places them where they should be in their proper relation to clinical teaching, as Dean Emerson has pointed out.

I wish to emphasize the point that the bulk of our teachers are men in general practice who go into the wards and give so many hours a day to teaching. This does not bring the laboratory side too prominently into view in connection with the wards. Our object is to have clinical teachers engaged in general practice who have a wide experience. We have specialists who can be utilized and kept in their proper place.

THE COST OF MEDICAL EDUCATION TO THE STUDENT

IRVING S. CUTTER
UNIVERSITY OF NEBRASKA
OMAHA

A questionnaire was devised which was mailed to all students in each of the four medical years of the following institutions: University of Indiana, University of Iowa, University of Maryland, University of Michigan, University of Nebraska, Syracuse University, Medical College of Virginia and University of Virginia. The questionnaire was printed, a stamped addressed envelope enclosed and the student was urged to supply reliable and accurate data, consulting the source of his funds and checking back through check stubs, etc., in the event that he had kept no accurate account of expenditures. Rosters of the medical schools covered were obtained through the courtesy of the Council on Medical Education and Hospitals.

The schools selected covered a fairly wide range as to type. Of the state universities Virginia, Iowa and Michigan have located the medical school at the seat of the university and in towns of small size. Syracuse was selected as representative of a Middle States institution outside New York City. The Medical College of Virginia, located in Richmond, a city of 171,000, was selected as affording comparison with the University of Virginia, located in Charlottesville. Between 50 and 60 per cent of the questionnaires were returned. In no case were there returned less than 40 per cent and this only from one school. The compilation, therefore, is based on more than one half the total enrollment for the session 1920-1921 of the eight schools named. Schools in New York City, Boston, Philadelphia and Chicago were purposely omitted from the list as it is the intention to group these schools at a later date in a separate study.

Much care was evidenced throughout on the part of the individual student in completing the questionnaire. In many instances supplementary remarks were made by parents or guardians and slight discrepencies in the student's estimate corrected. In some instances the questionnaire was filled out entirely by parents to whom the blank had been forwarded by the student addressed.

Approximately one third of those replying requested that they be notified as to the results of the study.

Averages of totals from the several schools show surprising uniformity, although between the highest average—Michigan, $1,027.77—and the lowest average—the University of Indiana, $787.93—there is considerable "spread." The high average of Michigan is due to higher averages for table board, textbooks, instruments and recreation. The low average of Indiana is accounted for by a lower outlay in the items of recreation, clothing and lodging, in spite of the fact that table board is higher in Indiana than in three other schools. Wherever totals were found to fall much below the general average for a given school, usually some expense abatement was noted, such as living with parents or relatives where no charge is made for board or room, or serving as undergraduate intern, hospital orderly, hospital pharmacist, etc. In such instances the totals fail to include the items of board and lodging. Where the students live at home the total is over $200 lower that the average for the school in question.

The average tuition charge for all classes, including all laboratory fees, etc, is $187.16. The average microscope fee, including those schools which provide for microscope purchase, is $26.49. This varies from $52.78 in the University of Iowa to $6.36 in the Medical College of Virginia. The annual cost of textbooks is very uniform—Indiana, $43; Iowa, $48; Maryland, $47; Michigan, $54; Nebraska, $45; Syracuse, $44; Medical College of Virginia, $53; University of Virginia, $42; an average of $47 for all students in all schools covered. There is an additional annual general average of $22 for supplementary textbooks and instruments.

The bulk of the student's expenses consists of five items: first, table board; second, medical fees; third, lodging; fourth, clothing, and fifth, recreation. There is a general average of all students reporting of an annual expense of $247.53 for table board. These figures, too, show surprising uniformity. The average of Indiana is $244; Iowa, $238, Maryland, $231; Michigan, $272; Nebraska, $249; Syracuse, $257; Medical College of Virginia, $215, and University of Virginia, $271. Laundry also shows marked uniformity, with a general average of students reporting of $29.27. The laundry item is considerably

lower in the small towns. For instance, Iowa, in a town of 11,000, shows an average of $26.54. Nebraska, in Omaha, a town of 200,000, shows an average of $35.91. The laundry item in 10 per cent of those replying consisted of little more than postage on laundry which students sent to their homes and received in return by parcel post. Cleaning, pressing, etc., follows the laundry item very accurately with a general average of $15.45. Transportation shows a general average of $20.46. This is lowest in the smaller towns, as Iowa City and Ann Arbor, with the averages, respectively, of $9.71 and $13.80. This item includes only such transportation expense as is incident to going to and from school, clinics, etc. The item of recreation covers theatres, social activities, entertainment, fraternity dues and miscellaneous expense not under separate caption. This item shows a general average of $110.20. Schools showing the highest general averages are Michigan, Iowa and Nebraska; the lowest are Indiana, Maryland and the Medical College of Virginia. The activities of college fraternities undoubtedly raise the average of this item. Many students belong to two fraternities or more. In case where fraternity expense is itemized, the average annual cost appear to be between $50 and $60. From some of the questionnaires it would appear that fraternity dues and assessments increase the recreation item by $50 or more. This is in some instances compensated by a lower charge for board and lodging than can be obtained for equal service outside the fraternity house. The clothing item shows a general average of $121.40 —above the average in the Medical College of Virginia and Michigan and below the average in Indiana, Maryland and Syracuse.

The University of Virginia has an annual average $7 lower than the general average, which places this school nearest the standard form. Lodging at the University of Virginia is $23 per year below the general average and is the lowest average for the entire eight schools.

One of the most interesting sidelights on the cost of medical education is the comparatively large number of students who are earning nearly one-third of the total annual expense. In three schools, namely Syracuse, Nebraska and Indiana, over 60 per cent of the students replying to the questionnaire earn something during each medical year. The general average shows that 45

per cent of all students replying from all schools are earning. The average earnings per year of all working students is $268.84, or approximately $30 for each of the nine months. This $268 constitutes 30 per cent of the student's total expense. In other words, a little over 40 per cent of all the students replying earn nearly one third of the total annual expense. It would seem that the larger cities afford numerous opportunities for student employment, although working students in the University of Maryland average only 25 per cent. Some schools discourage and even forbid outside employment on the part of freshmen medical students. This seems most desirable. The student at best has considerable difficulty in orienting himself to the seriousness and difficulty of the freshman medical year. The smaller the number of outside interests, the more definitely will the student's attention be focused squarely upon his work.

As a rule, the junior medical year is the most expensive. This is true of Iowa, Maryland, Michigan, Nebraska, Syracuse and the Medical College of Virginia, whereas at the University of Virginia the sophomore year, and at the University of Indiana the freshman year, show peak costs.

The large number of replies received from parents and guardians indicate interest on the part of those who pay the bills. If the compilation has no other value, it may serve to strike a general average beyond which the careful student need not go, and up to which careful parents may be justified in supplying funds.

One should keep in mind the fact that the estimates are for the school year 1920-1921 when costs of table board, lodging and clothing were probably on a higher level than at this date. There has been a general reduction this year in these three items of approximately 20 per cent over figures of 1920-1921. This general lower level undoubtedly prevails over the country and questionnaires sent out at this time would show comparative results.

The items of medical fees is bound to increase rather than decrease. There seems to be a tendency to insist that the student, a member of a special class of society, shall pay a larger proportion of the increasing cost of medical education. The increase in medical fees has not kept pace with the increased cost of medical training. The ratio between the fees received and the cost of

the training of the student has been a diverging one. Medicine, on the other hand, should not become a profession limited to the sons of the well-to-do—which tendency has been noted in England for a number of years. The number of scholarships available for good students is increasing. Even in the Middle West state universities this schollarship factor will offset the increase in medical fees. On the whole, the averages for the schools for the year covered, 1920-1921, do not seem unreasonable. The low average of Indiana means apparently but one thing, that the students are much more economical generally.

AVERAGE ANNUAL COSTS PER STUDENT

Medical School	Total Spent	All Fees	Books & Instruments	Lodging	Table Board	Recreation	Clothing	Earning	Earnings
Indiana	787.93	162.36	62.47	115.56	244.76	90.36	106.79	61	312.85
Iowa	850.18	159.76	77.20	122.01	238.41	122.85	121.81	39	226.24
Maryland	902.24	228.80	69.05	124.13	231.04	95.31	97.79	25	270.13
Michigan	1027.77	167.83	79.87	160.12	272.62	128.01	136.55	46	297.87
Nebraska	871.04	135.49	68.16	137.02	249.16	125.43	122.46	66	330.11
Syracuse	869.61	237.75	63.77	112.22	257.67	113.06	112.77	67	189.36
M. C. of Va. ...	926.28	214.79	70.63	117.35	215.47	92.33	148.78	35	275.75
U. of Va.	882.28	190.43	60.57	100.18	271.09	114.24	124.48	27	248.42
Average	889.66	187.16	68.97	123.57	247.53	110.20	121.40	45	268.84

On the whole, this study would appear to be worth while from several points of view. First the figures returned show every evidence of care on the part of the student as to accuracy. Second the variation in the group of schools chosen demonstrate that students may spend much less than they usually regard essential. Third, the number of students who are earning at least a part of their yearly expense appears to be large and the amounts earned average for all students employed $30 a month. Fourth, persons contemplating the study of medicine are offered the experience of approximately a thousand students. Fifth, the general average obtained represents in all probability the annual expense of a normal college student who gets the most out of college life—professional, cultural and social.

DISCUSSION

DR. E. P. LYON, Minneapolis: What are the minimum figures that a student is able to get along with?

DR. CUTTER: I did not bring them with me, because they would run out into an interminable length. If one analyzes the questionnaire that was sent out, it will be found that the average low figure was about $450. Among the questionnaires came data of students rooming together and doing their own cooking. In some cases, three or four students were

living together, and in their cases the minimum cost was about $450. This includes all fees and details of annual expense of students.

DR. BILLINGS: Did you make any comparison between the actual cost to the university and the students' work in the institution?

DR. CUTTER: I do not know.

DR. BILLINGS: How does the amount average up with your own school in Nebraska?

DR. CUTTER: The cost per student is about $400 in the University of Nebraska.

DR. COLWELL: The figures given in the detailed reports from sixty-two colleges show $685 per student.

DR. HOUGH: I have been engaged in studying the budgets of many medical schools in this country, and excluding the highly endowed schools or those schools insufficiently supported, I have found that of those reporting the average cost was about $585.

DR. CUTTER: I think I stated in my paper that there were a number of schools that prohibited students from working in the first year. In one school where students worked a part of the time, it usually took one additional year, or five years, to complete the four years' course. Our own experience in Nebraska proves that, as a rule, the man who earns part of his way by working is a better student.

DR. CHARLES P. EMERSON, Indianapolis: Many of our students have earned a good deal of money toward their self-support during their student days. I would like to emphasize that the faculty has to do a great deal to keep down the ambition of certain students who want to pose as aristocrats. Before I went to Indiana members of the faculty distributed themselves among the fraternities and were elected as honorary members. They met and mingled with the boys, thus creating a good spirit in university life, and in that way they were successful in getting the students in a rather economic frame of mind. We should try to hold students down to modest, decent living, so that they can get along with less money than some of them do. We made a careful survey of those who worked to support themselves, and found not a few who had no business to earn their support. Many of the boys were getting good incomes or allowances from their parents and had no need to work. We discouraged students from pursuing that policy where it was unnecessary, but those students who did not need to work for self-support got the idea that it was the right thing to do because other boys wanted to do it. Some would wait on table, some would work in laboratories. It is possible to create an economic spirit in the student body, and some of our best students have been those who worked for their support.

LIBERALIZATION IN MEDICAL EDUCATION

A. C. EYCLESHYMER
UNIVERSITY OF ILLINOIS
CHICAGO

In human progress there are two fundamental processes which sometimes proceed equally, but usually one or the other is dominant. These two processes are extension and consolidation. In the birth and growth of nations there is first settlement in colonies due to community of thought and action; this expansion is followed by a union; national expansion leads to international alliances; the expansion of alliances leads to consolidation into world leagues. In the growth of religions many beliefs are unified by the Christian religion; then extension of doctrines leads to innumerable sects, followed by attempts at consolidation. In the more specialized fields of activity the same processes are observed. In celestial physics the theory of gravitation coordinated the scattered and divergent views; then came a period of differentiation, followed by attempts at coordination in the theory of relativity. In the field of medical science there are many illustrations of the same procedure. Scattered observations on variations in the blood, phlegm and bile during illness were brought together in the humoral theory of disease; in like manner, studies on bacteria were unified in the germ theory. Studies on heredity and environment found common expression in the theory of evolution. In the past, medicine was largely restricted to the diseases of mankind. At present, she recognizes the intimate relationships of the diseases of plants and animals to those of mankind. In the near future she must take into consideration the diseases of metals; ultimately her domain will extend widely over both the organic and inorganic world.

In the growth of knowledge in all of its special fields and great provinces, and as a whole, two processes stand forth, namely extension and consolidation, specialization and generalization. The vitalizing factors in these are: individual thought and collective thought.

Whether one follows the theory of evolution or accepts the teaching of the book of Genesis, he must contemplate the beginnings of intellectual growth in the individual. Individual

thought precedes collective thought. Individualism, in the abstract, postulates that each human being may live to the fullest extent his own life as he wills. According to biblical history it attained its greatest development with the first inhabitant of the earth but did no reach its ideal. The family embodies the first step in the growth of collective thought; and as the family grows, individuality becomes restricted. Here and there it breaks away from the common modes of thought and action and asserts itself in differences so pronounced that one member becomes a genius while another becomes a black sheep—a Rocail and a Cain. Rocail erects a sepulcher adorned with statues of various metals, made by talismanic art, which move and speak and act like living men. Cain becomes jealous and envious of Abel and murders him.

Community life further accentuates common thought and is necessary for the preservation of mankind; but with its growth, individuality is again repressed. Through the ever increasing restrictions brought about by unity of purpose and organization, individuality is forced toward the average. Ideas either destructive or constructive must go up or down to the level of common thought. Great leaders, philosophers, statesmen, and scientists, have been those who have resisted these equalizing forces. Now and then a voice cries out: "here am I lone wanderer in endless search of myself. For aeons I have been searching from star to star down the ages until I chanced this way. . . . I love the idea of equality, fraternity, democracy, but I must soon leave this crowd and wander on until I come to the kingdom of my solitary soul." He who explores ways of thought or action far ahead of his contemporaries must have an inner world in which he passes long and solitary hours. If he be engaged in scientific experimentation, in an unknown land with neither map nor sign post, he may lose his sight as did Bunsen, or his life as did Lazear.

If the development of individuality be ignored, one of the greatest forces in the progress of mankind is lost to the world. On the other hand, the principle of collectivism underlies our entire social organization. It develops a general bond of likeness between the one and the many; it makes the individual a part of the whole; it leads to similarity, equality, fraternity, democracy. It enables us to move in companies, regiments, bat-

talions, divisions and armies. Without it, a nation sinks into oblivion and a world may be lost. Without individualism the same is true. A commander-in-chief, a great field marshal, is as necessary as the army. A million souls submerge their individuality for a common purpose, but each cries out where am I going? What am I doing? What I have in myself is moribund. I am physically an automaton, and intellectually boots, boots, boots.

The child accepts life as it is; it sails in a ship over seas that are calm; it knows naught of the larder, ballast or sails; the length of the voyage; the course or the destiny. Its life is in another's keeping; its own life is unknown; nothing stirs from within. The youth thinks of the ship; the voyage; the strange lands which bid him come. Self is beginning to assert itself; something stirs from within. Maturity builds a ship, carefully equips it, and sets forth on an uncharted ocean in quest of a new world. Something within takes possession of the heart and soul and guides every act.

Education is the bringing out of something from within; not the forcing of something in from without. Its emblem was written by an unknown hand on the walls of Delphi—"Know thyself." It is this something within the personality, the essential self, the individual which must receive greater consideration in our schools. What I have in common with others is best developed by the school. What is mine and mine alone cannot go to school with anyone but it can be stimulated, intoxicated, liberated.

Let us proceed with the central thought: greater men in medicine through greater liberty in medical education. A medical school is built on the same general foundation as any other institution. Purpose, products, materials and methods form the corner stones.

The purpose of the medical school is to train men in the application of scientific methods to the prevention, alleviation and cure of disease and the advancement of medical knowledge in its broadest sense.

The products of medical schools may be considered as belonging to three principal groups; the practitioners, the investigators and the teachers. A survey of the medical profession at large shows that its eminent men usually may be placed in one

or the other of these groups; sometimes in two, but rarely in three. The group of practitioners comprises those whose primary interests are in the alleviation and cure of disease. The group of investigators includes those whose deepest interests are in the causation and prevention of disease. The group of teachers contains those whose principal aims are the dissemination of the methods adopted and the results achieved by the practitioners and the investigators. Lister, Pasteur and Osler typify the groups.

A few decades ago the country demanded, and the schools furnished, for the most but one type of practitioner, and that type was the all round practitioner. He was obliged to know something of medicine, surgery and obstetrics, together with dentistry and pharmacy. In addition to these, he was expected to show proficiency as a veterinarian. The conditions of today are so different that the all round practitioner of today would have been a specialist fifty years ago. The cries from the country for general practitioners are heard far and wide but are less and less heeded by the young graduate. A doctor who has had modern training in laboratories and clinics with apparatus and libraries and contact with progressive men, is quite unwilling to leave all these. Moreover, he cannot come up to dear old Dr. Brown to whom physiognomy revealed more than modern laboratory methods; who performed many a successful major operation on the kitchen table, and who thought nursing and a controlled environment entirely superfluous. The ambitious young doctor of yesterday, following the advice and example of his successful seniors, went forth to do an all round practice for a number of years before entering on the study of a specialty. Away from libraries, laboratories, clinics and stimulating colleagues, he found little growth or expansion, beyond that indicated by adipose tissue. The ambitious young doctor of today who contemplates a career as a specialist dispenses with this hibernating period of two or three years and seeks instead the live atmosphere of the hospital, an assistantship to the master, or a fellowship in some one of our great foundations. The rural districts and small towns will be obliged to adopt something of the same methods that they long ago adopted in securing churches, schools and factories—they will be obliged to build and equip hospitals if they hope to obtain modern medical service. With the hospital comes the staff which, in turn, forms the basis of the

group clinic. Instead of the general practitioner making a complete diagnosis there is a group of collaborating clinicians, each of whom is an expert in his particular field. The rapid development of the group clinic is creating a situation which must be recognized both by the profession and the schools.

The practitioner of the future, either general or special, not only must measure up in self-reliance, responsibility and judgment to the practitioner of the past, but also must be better trained and more thoroughly imbued with the investigative spirit.

Each patient presents a problem, the solution of which is more difficult than that in almost any other field of science. While every medical problem must be approached through the avenues of physics, chemistry or biology, the physician is often baffled at the very beginning of his work by the fact that he is unable to determine which will aid him most. Often he finds that no one of these sciences will solve the problem but that all are involved. Physics may explain the mechanism of joints and muscles; it may aid us in the interpretation of the effects of light, heat, electricity, osmosis, pressure on living tissues, but it does not explain nerve impulses, sensations, memory or thought. Chemistry may teach us the rates of protein, carbohydrate and fat metabolism in health and disease; it may help us to know more of the precious vitamins and hormones, but it does not tell us why one child resembles the father or mother physically and mentally, which another child does not. Biology may aid us in solving this problem, but she, too, is extremely jealous of her secrets. She readily acknowledges that the process of fertilization is essentially the same throughout the animal kingdom, but she teaches us that the processes of regeneration are entirely different in different forms, and cautions us not to infer that a new leg will grow out from an old one in man as it does in lower animals. She teaches that the organs of seeing, of hearing, of smelling, of tasting, of feeling, are the organs through which these sensations habitually are received. But she warns us not to infer that the loss of one of these special sense organs means an entire loss of that special sense. Our senses overlap to a degree which we little realize—light perception through the skin; sound perception through all parts of the body; color perception through both sound and smell—are a few of the many possibilities as revealed in the lives of Laura Bridgeman, Helen

Kellar, Willetta Huggins and others. Deductions from the phenomena presented in these various fields are extremely hazardous and emphasize the necessity of working through the avenues of multiple hypotheses in the interpretation of disease. When this has been said let us also recall that the names of diseases, of their courses and of their processes are broad, generic terms, which signify physical, chemical and biologic complexes. Acuteness in observation, precision in experimentation and caution and judgment in deduction are the essentials for the interpretation of disease. They are the A B C of the practitioner of the future.

One of the greatest needs in our medical schools of today is the encouragement of students to devote their lives to the study of the causation and prevention of disease. It becomes more and more apparent, as set forth last year by the committee on graduate work, that the medical schools must give opportunity and encouragement for men to develop as research workers. We need no longer argue that reproductive scholarship must be supplemented by productive scholarship. We accept the established fact that the investigative spirit must pervade the atmosphere of the medical school. Frequently a student stands where the roads fork and as William James puts it, "one branch leads to material comfort, the flesh pots, but it seems a kind of selling of one's soul; the other to mental dignity and independence, combined, however, with physical penury. On one side is business, on the other science." It is not enough for the student to stand in deep perplexity outside the private door of his teacher and whisper that research work is going on inside. He must be invited in, and given time to accept the invitation. It is, therefore, necessary that some provision be made whereby any student may come more intimately in contact with research methods and ideals than is possible in our medical course of today. How far we can organize research is a question. There is no doubt but that to some extent we can create the investigative spirit. At any rate, we can help the young man who evinces this spirit; we can give him time; furnish him with apparatus and books; point the way to fields of investigation; discuss his problems and help him in his experiments. We cannot dominate him nor restrain him. We cannot force him to work independently or in cooperation; this must depend on his bent, his personality, his

individuality— genius cannot be organized nor can it go to school.

In every medical school there are those who are deeply interested in presenting summaries of the progress made in certain fields of medicine, or in the entire province of medicine. Their object is to sift out and correlate well established procedures. They may be neither practitioners nor investigators in the sense previously mentioned. They are, so to speak, the editors of medical facts and theories; the compilers; the writers of textbooks; the historians. This group we may designate as teachers or medical journalists. I am fully aware that this group is one created by American institutions and will doubtless become extinct in time for the simple reason that teaching must be accompanied by thinking; teaching and research are inseparable. The great teacher has always possessed the investigative spirit but may not have been a great investigator. We must, at present, make provision for those who wish to prepare for teaching in its broadest sense.

These three types have been designated as they exist today. They are generic rather than specific. They possess many attributes in common and may sometimes form a trinity.

The materials to be converted by one method or another into the products set forth are students who enter the medical school with a high school education and at least two years of college training. There are no two who have followed the same course of study with the same degree of interest or who have reached the same results. In the high school the student feels his way through a large range of group electives, and often before entering college he has decided that he will major in agriculture, engineering, law, theology, or medicine. In his college work, electives have enabled him to accentuate his choice, or perchance, to find that his decision was wrong. In both high school and college the student may have inclined toward subjects involving manual training and thereby have acquired keenness of touch and dexterity, or toward music, cultivating the sense of hearing. He may have elected biologic sciences, accentuating observation. He may have turned toward mathematics, physics and chemistry, emphasizing precision in deduction and experimentation. He may have laid special stress on history or languages thus acquiring an excellent memory and facility of expression; or, per-

chance, on philosophy, thus devoloping the power of abstract thought.

Those of us who come in contact with these men as they enter on the study of medicine are impressed by their differences in concept, habit and training. He who comes from the land of mighty oceans, forests and mountains, thinks in larger terms than he who comes from the truck farm. The boy brought up in the country better understands the thought and action of the country folk than the boy brought up in the city. The boy who is reared in the highly commercialized districts of a great city regards an education in quite a different light from the one who is reared in a college or university town. One student is always on time, another is always behind time; one works quickly, another slowly; one is deft, another clumsy; one student retains best what he sees—his memory is visual; another retains best what he hears—his memory is auditory; still another remembers best what he reads—his memory depends on word associations. One mind stores up isolated impressions and facts—it is analytic; another arranges impressions and facts in groups—it is synthetic. Will the student who is slow and clumsy ever make as efficient a surgeon as the one who is quick and deft? Will the one whose memory is auditory, or depends on word association, ever succeed in surgery as well as another who is able to visualize the positions and relations of organs in the body? Will the student who has an untrained ear ever make as efficient an internist as the one whose keenness in sound perception and discrimination enables him to differentiate between normal and abnormal sounds in the lung or heart? Is the one with an analytic mind as capable of interpreting a syndrome as another whose mind is synthetic? It is beyond question that the men who enter the medical school at the age of 22 or 23 years are quite unlike in their mental equipment and this fact must be taken into account in the medical curriculum.

The method of the medical school is the curriculum; around it center to a large extent the resources of the school, and through it are expressed the principles and concept of medical education. The curriculum of half a century ago was probably the best that could be devised to meet the needs of the profession and schools of that day. From an economic point of view, it was highly advantageous; one teacher could lecture to a large

number of students and was entirely relieved of the time consuming instruction to small groups and individuals. It was an excellent mechanism for turning out one type of general practitioner. While it served, in part, as an intellectual pathway, it also functioned as a "straight jacket." It kept the students so busy that they could not destroy much property nor throw out many professors. Today the conditions are entirely different. The financial situation has changed so that the school is no longer a recipient but a donor. The students are better trained both in behavior and intellect and are more eager for instruction. Many teachers are on a vocational basis and are able to give more time to instruction. Moreover, the medical school no longer looks to a single product, but to many products. The fixed curriculum of half a century ago will not meet the conditions of today, yet, in principle, it has remained unchanged.

Our national organizations dealing with medical education have recognized and emphasized the need of a more liberal curriculum but have not adopted measures that materially assist the medical school in the development of such a curriculum. The fixed curriculum is so deeply rooted, so widely spread and so thoroughly fostered that state examining boards are rapidly adopting or creating such curriculums as the basis for medical licensure. "Eight months in each of four separate calendar years," devised for the improvement of medical education became a serious obstacle to patriotic service during the late war, and is no less an obstacle to education at the present time. A curriculum covering 4,000 prescribed hours is another mechanism to protect and advance medical education but it has defeated thinking. Medicine and medical specialties, 900 hours; surgery and surgical specialties, 648 hours; obstetrics and gynecology, 216 hours are artificial divisions proposed by the medical educational bodies as a means of insuring better trained physicians and of eliminating bad medical schools, but these regulations have resulted in the state boards going one step further with the same good intent. But what a handicap has followed as a result of these measures. One state requires 170 hours of general pathology, another 240, another 250, and still another 270. Like variability is found in practically all the subjects in the state board curriculums. Certain peculiar requirements are exacted by some of the state boards. For example, one says in

substance, either teach 60 hours of electro-therapeutics or your graduates cannot practice in our state.

The day is not far distant when the schools must either incorporate in their curriculums the particular requirements of each state board curriculum or find that their graduates are not qualified to practice in these states. To incorporate these requirements means an enormous time expansion and this is impossible. The schools are thus approaching an impasse of their own creation and some remedy must be found. The one obvious solution is the creation of an elastic curriculum. The students in entering the medical school with a fixed curriculum are beginning a four year program that requires all students to do essentially the same kind and the same amount of work at the same time and in the same way. They are leashed together, made uniform in action and thought like the rowers in a great galley; shackled hand and foot, heart and soul, with chains of our own forging. It follows that the more uniform the special senses and intellectual processes, the more efficient becomes such a curriculum. To reach its maximal efficiency, we must revamp and equalize the special senses and intellectual processes—but is this education?

The fixed and congested curriculum of today must give way to an elastic curriculum which is adjustable to instructional resources, clinical resources and to the growth of medical science. It must provide for collective teaching; cooperative study and individual study.

Alexander Bain tells us that in the Scottish universities prior to the eighteenth century the quadrennial arts course was conducted by so-called regents, each of whom carried the same student through all the four years. In a rectorial address to the students of Aberdeen University, in 1882, he said: "You the students of arts, at the present day who encounter in your four years, seven faces, seven voices, seven repositories of knowledge, need an effort to understand how your predecessors could be cheerful and happy confined all through to one personality; sometimes juvenile, sometimes senile, often feeble at his best." Contrast this with the condition today, when seventy faces, seventy voices and seventy personalities are encountered by the medical students in the four years of their course. To the single instructor the student could carry his entire intellectual possessions; to

each of the seven, one-seventh; to each of the seventy, he can carry but one-seventieth. But what instructor realizes this and is willing to accept his proportion? Each demands more than the student can give, and the student under this tremendous pressure loosens his hold on the get-something idea, adopts the get-by methods and revises his ethical principles accordingly.

Probably no field of science is undergoing a more active fermentation than medical science, with the splitting off of new segments; the discarding of certain subjects; and the addition of new subjects. Just as physiology and pathology split off from anatomy, so biochemistry is outgrowing physiology; bacteriology is asserting its independence of pathology; pediatrics and neurology, otolaryngology and ophthalmology are attaining independence from general medicine and surgery. Owing to the increase in entrance requirements, certain subjects like chemistry, embryology, histology and comparative anatomy are being shifted from the medical course to the premedical course, while other subjects like osteology, bone modelling, etc., have fallen by the wayside. Again, there is going on a continual importation of subjects from the outlying fields of investigation. Immunology, roentgenology and parasitology have been brought into the curriculum from these outlying fields. The schools that are most actively engaged in the exploration and investigation of borderland subjects find greatest difficulty in holding to a fixed curriculum.

The clinical resources of one school may be quite unlike those of another. One is favorably situated for the study of tropical diseases, another is able to utilize a great tuberculosis sanatorium, another a great psychopathic institute. The school should be able to adjust its curriculum to these resources. If in South Africa, study sleeping sickness in the clinic, in the class room, and in the laboratory. If in Panama or Louisiana, emphasize, if you wish, malaria; if where cretinism abounds, study it, teach it and think it. While one school may thus emphasize this or that particular line of study, all are studying disease, and the underlying principles of disease prevention and control are not distributed geographically. On the proper certification that a student has had four or five years training in a good medical school should rest his qualification to practice. If it be expedient to protect the public by some form of state or national examina-

tion, such examination should be directed solely toward determining the student's ability to work and think in terms of disease prevention and control.

This principle of collective teaching in all education is based on the assumption that all human beings possess certain resemblances both physical and mental; otherwise we could not speak of them as a group. Each person possesses more or less of every ordinary human power. Our senses of feeling, tasting, smelling, hearing and seeing are similar; their actions and interactions on an inherited substratum are reflected in thinking, and modes of thought run along fairly parallel lines. Collectivism stimulates a spirit of emulation; of comparative evaluation of mental assets both quantitative and qualitative. It arouses a sense of power which enables a member of a group to overcome obstacles which would defeat him if he were alone. This is forcibly illustrated by the heroic deeds of the soldier when inspired by the common purpose of the group. The status of the medical profession demands many elements of collectivism. There must be developed in the medical students a fraternal sympathy; a spirit of mutual consideration, and a basis for disciplined, or expert, cooperation. There is a fairly common substratum in each subject, in each great division, and in the curriculum as a whole, which can be presented collectively, and whether or not this be the method of the future, it must be the method of the present because it is an economic necessity. These are some of the considerations which justify class lectures, class demonstration, class experiments and class examinations. It must not be inferred, however, that it likewise justifies the existence of the present division of students in freshman, sophomore, junior and senior classes. This grouping is a menace to education and should disappear as soon as possible, especially in the medical school.

The spirit of cooperation between faculty and students in medical training is one of greatest value to the student, not only for the school period, but throughout his entire life. In order to develop this spirit, we should determine as far as possible the special assets of each student at the time he enters the medical school, and ever keep in mind his adaptability for certain kinds of work. Much can be learned through contact afforded by laboratory work and through the seminar. This should be supple-

mented by a knowledge of his home life, his living conditions and his social habits, etc. Through careful observation and inquiry, we must obtain as clear a picture of the student's individuality as is possible. With this as a guide we should help him to place his assets where they will yield the greatest returns. Experience teaches that most students, at the end of the second or third year of the medical course, have decided whether they wish to lay equal emphasis on medicine, surgery and obstetrics, fitting themselves for general practice, or to give some emphasis to one, fitting themselves for a special field. If, in the judgment of the faculty, the student's selection is wise, he should be permitted to accentuate his choice. In the fourth year the student should be allowed a further latitude which will permit him again to accentuate the all round training in medicine, surgery and obstetrics, or to lay further emphasis on one of these. In the fifth year, he should be given the liberty to round himself out for general practice as an intern, or to add to his special training, or to do independent work in research. Collective teaching and cooperative study are both necessary but they both are drawn into a common vortex unless supplemented and invigorated by individual study.

Individual study alone starts the waves which roll on and on toward the unseen and unknown shore. Working in harness is most excellent for the development of the team, but the freedom of the fields is necessary for the growth of the individual. What an inspiration comes through the exploration of the limitless fields! What a thrill comes when the individual receives a new interpretation or new revelation of nature's laws! How hopeless to read a description of the country one is about to explore. It is known only by exploring it. Individuality derives strength from the history of science, its workers and their work; but no record or experience coincides with it. They are as guide posts which disappear at the frontiers of science and individuality must wander on alone. The light from the north star may direct its footsteps but the light which comes from the soul spurs it on. The traditional home of individuality is in the university, and here is the one place where it should be fostered and encouraged. It is fair to presume that in each of our medical schools there are today students of great potentiality who need but the stimulus and opportunity to become leaders in science.

How shall they be given the opportunity? One of the simplest of the initial steps to be taken would be to grant the student the privilege of electing a certain portion of his work, both quantitatively and qualitatively. The privilege of adjusting study to his capacity should be restored. It was distinctive of the earlier ages and each successive generation has lessened the privilege. The students of our day are expected to know more and must consequently attempt to learn more than the most brilliant intellectual leaders of the past, who would be content today with the schooling of Horace, of Shakespeare or Darwin. Where they learned one thing we are attempting to learn a half dozen. They acquired knowledge; we attempt to do so. We cannot keep the medical students marching in the trodden paths of their predecessors until weary and heartsick they complete the march, only to find that they have also acquired mental debility on the way. We must encourage them to forsake the trodden paths to break tradition when tradition is outgrown and to explore the unknown fields. Individuality can never be limited to the mechanism of public order, either within or without the school. Life is bigger! it asks for more. There is only one way to develop strong men, and that is by helping them to become independent thinkers. Electives are the stepping stones to independent thought, and independent thought is the threshold of knowledge.

Throughout nature there are many beautiful pictures of collective and individual effort. Who can but envy the ideal presented in the life of the wild honey bee that belongs to the swarm and works with her companions for a common purpose. Her coming and going are regulated by no schedule or matter. She goes through the forests, along the streams, over the meadows, from flower to flower, gathering nectar from wherever it can be found. Ever going, ever returning she not only increases her particular store, but enlarges that of the swarm. Beyond and above all these, and all unknown to her, she gives to mankind greater blessings in flowers and fruits.

Let us give to the student opportunity and encouragement to seek truth wherever it can be found. In bringing truths together he builds not only for himself but also increases the comomn fund of useful knowledge. Beyond and above these, he helps to build a great fund of knowledge which will illuminate life in the years to come.

DISCUSSION

DR. GEORGE M. KOBER, Washington, D. C.: I made the first plea for greater uniformity in the curricula of medical schools in 1902, and was the chairman of the first curriculum committee of this Association appointed to prepare the standards for such uniformity. After all, there are definite reasons why a minimum standard of hours might be considered. The medical school is dealing with the average well bred, fairly well educated young man. These students are men of average capacity. A genius is to be found in almost every school, and I am sure that he will find ample outlet for the development of his genius if he is disposed to do. The standards suggested in 1902 dealt with a 4,000 hour standard. We realized at the beginning that the first and second year work was difficult, and the number of hours assigned to these two years were between 800 and 900, and a larger number of hours were forced on students in the clinical work. We also felt that it was impossible, for example, for the average student to absorb all his anatomy in the first year, and therefore we included anatomy and histology in the first two years. This course has stood the test of time, and institutions like Harvard have adopted within the last few months the standard we suggested in 1905. That standard was by no means hastily prepared. We reviewed the curricula of all medical schools, and we found the greatest possible variation, depending largely on the influence and reputation of the different teachers. It was surprising how some of the schools permitted orthopedics and ophthalmology to have more than 200 hours a year, when much more important subjects did not get that much time. We also investigated the product of the schools, and the best evidence we had were the competitive examinations of the Army and Navy at that time.

A period of ten years revealed that certain schools developed stronger students. In some of the best schools we found the students were particularly strong in the laboratory branches but woefully deficient in the clinical branches, and so on. We had every reason to assume that this depended either on the character of the teacher or on the amount of time and emphasis placed on these studies, and we concluded that there was really need to establish certain minimum requirements, so that the average student could devote so many hours to the study of various departments in proportion to their relative importance. Certain schools overemphasized certain departments, and therefore failed to produce what we call harmoniously educated general practitioners, capable of recognizing disease and well trained to cure. These are really the reasons why we recommend somewhat uniform standards intended for the average student that we deal with in medical schools, and while I believe a great deal can be said in favor of liberalization in the way of amending our present curriculum, we should always keep in mind that very fact of minimum standards.

Boards of licensure say the student must attend so many obstetrical cases, so many anesthesia cases, and so on, but they ought to adopt the same standard of this Association, so far as medical curricula are concerned. I am in favor of amending the curriculum so that it can be adapted to a large number of students. Some studies, like embryology, might be taken in the premedical course.

DR. WILLIAM KEILLER, Galveston, Texas: I am going to take a very

unpopular side of this question today. I cannot help but feel that you are viewing the organization from the opposite swing of the pendulum. You are forgetting all this time that you are not training specialists. Seventy-five per cent of the men will be general practitioners, and you have to send these men out to take care of the average patient. You are taking the point of view of the specialist. You are all specialists, and you have swung to that side. In Texas we have to send out men who are not specialists, but who have been general medical educators. You are tending to err on this side. You get men together to learn pathology, and you will find they take special pains for investigating something, and you say these men do not know very much about pathology because it is such a big subject, even though they study the subject diligently. If you set such a man to investigate Banti's disease, you send him to his third year knowing all about Banti's disease, but he does not know a thing about pneumonia or tuberculosis, and he does not know a thing about a hundred general diseases that he is going to meet. You are trying to cut down the number of hours devoted to anatomy. You claim that there is a breach between the preclinical subjects and the clinical subjects. If you clinical men are in constant touch with preclinical subjects, if you are teaching medicine from the point of view of the anatomist, the pathologist, the biochemist, you will say: Gentlemen, you have been learning anatomy, pathology, and biochemistry. Now you have the opportunity to apply this knowledge to this clinical case. You are putting men to teach anatomy who know nothing about medicine and surgery. You ask them, what is applied anatomy? But you say there is no applied anatomy. But I say right here there is no anatomy that is not applied anatomy; there is no pathology that is not applied pathology. You are breaking away; you are taking two different points of view and are not harmonizing them. Do not forget that you are not teaching specialists; 75 per cent of the men you are teaching are going to become general practitioners, and they ought to have a general view of the whole subject.

DR. W. F. R. PHILLIPS, Charleston, S. C.: I agree with everything Dr. Eycleshymer said and I also disagree with him, paradoxical as that may seem. We are calling for liberalization of the curriculum. We are talking about a rigid curriculum. We have one that is crystallized, and I would remind the Association of the fact that this curriculum is quite as crystallized as that which was revised a few years ago. There is a great deal of liberty in the present curriculum. The curriculum calls for a minimum of 3,600 hours expressed in percentages, and it permits of variation in any of the subjects to suit the individual teachers. We cannot measure unless we have a measuring rod. I do not care how imperfect the rod is, it has got to be a measuring rod, and our curriculum as it is today is our measuring rod.

Some years ago a British committee investigated the vital faults in medical practice in diagnosis, and came to the conclusion, which I think is perfectly correct, that the reason diagnosis and treatment fall down so much is because the men who make the diagnosis and prescribe treatment do not think in anatomic, physiologic or pathologic terms. No one of us can go out and repair a machine unless we know it. As Dr. Keiller said, there is no anatomy that is not applied anatomy, nor pathology that is not applied pathology. Let us once and for all cut out the preclinical

subjects. It is medicine or it is nothing at all. If it is not medicine, it has no place in the medical curriculum.

DR. E. C. L. MILLER, Richmond, Va.: It has been assumed that we are turning out a finished product. We have gone so far as to say that there should be two years of preclinical subjects, and then all the rest of their lives practitioners of medicine are to study clinical subjects. I have been surprised at what the human mind can use as mental pabulum. For instance, Martin reached his point of eminence largely on a diet of Latin, with a little mathematics thrown in. We have oftentimes to make that possible as a diet, and see what Martin came to. Our sudents come to what they are going to be largely in spite of our training, and it does not make so much difference what they get from us in the way of facts as it is that they get the right spirit. If they get the spirit of being students, and carry that spirit with them when they get into their work, so that they may study anatomy, physiology, etc., the rest of their lives and not feel that they have finished their education on graduation, we will turn out students who will go on indefinitely, and the details we give them in the classroom are relatively unimportant.

REPORT OF COMMITTEE ON CURRICULUM OF THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES

HUGH CABOT, CHAIRMAN
UNIVERSITY OF MICHIGAN
ANN ARBOR, MICH.

Before submitting our recommendations for a new curriculum, we desire to call your attention to certain definite tendencies which have developed and properly given rise to much discussion and concern.

RIGIDITY OF CURRICULUM

Perhaps the most striking thing about the curriculum of American medical colleges is its increasing tendency to rigidity of requirement. It is true that this tendency has developed as a by-product from the very necessary and desirable effort to raise the standard of medical education. It is hardly possible to overrate the value which has accrued to medical education as the result of raising the standard with the elimination of a considerable number of inferior schools. In this work the Council on Medical Education of the American Medical Association has played a large part and together with this association and the boards of medical examiners is entitled to great credit. It is, however, not improper that we should at this time consider carefully what the results have been and whether or not these results have been wholly desirable. That a high degree of rigidity of requirement has results is obvious, and it is, perhaps, impossible to achieve an elevation of standard by any other method, but this rigidity has become serious and should receive careful consideration with a view to determining whether or not it can properly be mitigated without dangerous relaxation of the high standards obtained. This rigidity might be considered from two points of view; first, in its effect on the student and second, its effect on the individual school.

Effect on the Student—The increased requirement has now become so great that almost the entire time of the student from entrance to graduation is prescribed in allotted hours. This inevitably results in enforcing individual conformity both in the amount of knowledge acquired in the different fields and also in the rate at which that knowledge must be acquired. This

might easily have a tendency to produce a relatively uniform product and would do so if it were not for the notorious variation in the capacity and acquisitiveness of the human mind. It probably has to some extent tended to produce a similarity of product which is not clearly desirable, and it has had a tendency to put a premium on steady plodding work rather than on individuality of approach to the subject and the development of the personality of the student. The present course hurries students along without giving them time for contemplation, and while it may, perhaps, be true that every human mind is not capable of contemplation, still it is hardly safe to so plan the teaching schedule as to make it relatively impossible. Again, it tends to discount the notoriously different rate at which men acquire knowledge and to make it difficult for a student whose mind moves slowly but surely toward its goal to keep the pace, resulting, perhaps, in hardship to men of high grade though not rapidly moving minds. If it be true that a course so rigid has a definite tendency to cramp individuality, this must be regarded as serious, since it should be the prime requirement of education in medicine that it assist the development of individuality and put a premium on the development in the individual of those peculiar qualities of mind which largely distinguish him from his fellows and increase his value to mankind.

It has been suggested by observers whose opinions carry weight that the rigidity of the curriculum actually results in a loss to medicine of very valuable men who are unwilling to allow themselves to be jammed through a rigid course which though, perhaps, well fitted to the average, may not be suited to their peculiar capacity. It may fairly be doubted whether we can afford to lose to medicine men of this kind and an effort must be made to avoid rigidity if this is to be the price.

Effect on the School—Much that has been said in regard to the effect of the rigid curriculum on the student might in many of its aspects be applied to the effect on the school. The curriculum as it is at present has a definite tendency to produce a great similarity between Class A schools, and while a certain similarity in the general level of the course offered is not only desirable but essential, it would be unfortunate if the curriculum should have the tendency to standardize medical education beyond a reasonable point. It appears to us that individuality

in schools is no less desirable than in individuals, and it is clearly true that the conditions surrounding any given school will when allowed reasonably free play, result in a high degree of individual development. To a considerable extent, the best result will be obtained in any particular school or in any particular locality if a reasonable change be allowed to build the curriculum around the particular group of men who are or may become available. Rigidity of curriculum tends to make it difficult for each school to build its departments in such a way as to allow the widest scope for the chiefs of departments and to encourage them to develop teaching methods and the relation between required and desirable knowledge which their particular circumstances would permit. While it was undoubtedly true that, in the days before any attempt at standardization had been made, development of individuality had gone too far, it must be equally evident that it is possible by filling the required curriculum full to handicap development to a very serious extent. It is not possible at this time to say dogmatically whether or not the rigidity of the curriculum has, in fact, confined the individual development of schools to an undesirable extent, but we believe that the danger is a very present one and that it should now be squarely faced and avoided if possible.

THE WORKING OF THE PLAN OF CONCENTRATING PRECLINICAL SUBJECTS IN THE FIRST TWO YEARS

Perhaps one of the most striking changes coming more or less as a result of the standardizing of medical teaching was the concentration of the preclinical subjects. At the time this was done, it was regarded by many as a pretty bold experiment, but there can, we believe, be no doubt that it has constituted a definite advance over previous conditions. It is, perhaps, more important that such an arrangement should be made in the teaching of American students inasmuch as the criticism that they have lacked basic training has clearly been more or less valid. That the concentration has improved the basic training to a great extent and tended to offset this criticism will, we think, be generally admitted. On the other hand, this plan has now had an extended trial and it appears proper to inquire whether or not it has developed any weaknesses.

The obvious danger of this plan, undoubtedly foreseen from the start, was that it would tend to segregate medicine in the mind of the student and that he would come to think of the fundamental branches as somewhat removed, not only in time, but in application, from the clinical work. It is desirable that the medical student should be associated with things medical at the earliest point in his course, since the time which can be devoted to the study of medicine is all too short to develop proper understanding of the human body in health and disease, and particularly to develop in the student the art of dealing with human beings. It is properly true that in the days before the concentration of preclinical subjects, the student did, in fact, acquire more knowledge of manifestations of disease though he clearly lacked a foundation on which to base his knowledge. There appears to us to be some evidence that isolation of the preclinical subjects has resulted, and we desire to raise the question of whether or not it is possible to mitigate this isolation without interferring with the obvious advantages which have accrued under the concentration plan.

It is now the custom in many or most Class A schools to begin teaching physical diagnosis and clinical laboratory methods at some point in the second year, and the question arises whether this could to advantage be begun earlier. Clearly the physical examination of normal individuals is nothing but applied anatomy and physiology and the clinical laboratory examinations nothing but applied bacteriology, pathology and biochemistry. If it be possible to begin the teaching in these subjects at a still earlier period, it would have the effect of clinching the basic knowledge of the fundamental subjects at a time when the mind is still fresh and malleable and would, we think, tend to avoid some amount of repetition in the later years and, perhaps, scale down the percentage of knowledge which is absolutely forgotten and must either be relearned or lost. We think that there is some preventable waste which might be avoided if the fundamental subjects were more closely linked with the examination of patients. We recognize fully the physical and schedule difficulties, but believe that if the possible dangers of excessive concentration of subjects be borne in mind and every attempt to avoid the possibly resulting isolation, that ways may be found without damage to the learning of the fundamental subjects.

RECOMMENDATIONS TENDING TO MITIGATE THE RIGIDITY OF THE CURRICULUM

In attempting to work out a new curriculum, your committee prepared a tabular view based primarily on the recommendations of the two previous reports and showing what would have been the result if the plan of assigning a definite number of hours to each subject had been adhered to. You will note by reference to the tabular view that no startling changes would have resulted except a large increase of the hours required for the teaching of hygiene and preventive medicine—from a requirement of 54 hours to a requirement of 170 hours. This, we believe, to be entirely consonant with the widely held opinion that the absolute requirement in these subjects has been too small and that while in some schools a very excellent course has been given, in others it has fallen below what might be regarded as necessary and has yet complied with the previous recommendation. There can, we think, be no doubt that the importance of these subjects is now generally recognized, and they must, therefore, be given a much more prominent position in the absolute requirements. The other most striking increase would have been one of 100 hours in the combined field of pathology and bacteriology, the increase being about equally divided between the two basic subjects, and some increase in general medicine and also in pediatrics. It will be noted that the net result of these increases, large and small, would have been to add to what may be regarded as an already overburdened curriculum a total of about 440 hours. Such an increase your committee would feel very reluctant to make as we believe that the present absolute requirements are very high and have grave doubts whether they can be increased with safety.

We have, therefore, decided to recommend to the Association that the method of stating the requirement in terms of hours for each subject be abandoned. For this, we would substitute a plan which we believe will maintain the present high standard but relieve the curriculum of its present rigidity and allow individual development. Assuming that the present pre-medical requirement and the present required medical course of four years of at least eight months each, meet with your approval, we would state the requirements in each subject in terms of per cent and not in hours.*

Model Curriculum Based upon Reports of Committees of the Association of American Medical Colleges, 1919-1921

	Subject	Model 1909 Hours	Assn. Am. Med. Coll. Hours	Report 1920-1921 Hours	Report 1920-1921 Hours	Recommendation of Committee of 1922 %	Variation from present curriculum %
I.	Anatomy	760	684		740	14 to 18½	—½
	Dissection	370		395	350		
	Histology	140			140		
	Neuroanatomy	90		120-132	90		
	Embryology	90			90		
	Topographic Anatomy	70		Required in 31 schools; elective in 11	70		
II.	Physiology	270	288	280	250	4½ to 6	—2
III.	Biochemistry	200	180	About same as Physiology ¼ College yr. excl. of preliminary courses 162 hrs.	180	3½ to 4½	—½
IV.	Pathology	500	288	325	320	10 to 13	+1½
V.	Bacteriology and Immunology		126	150	150		
				50	50		
			414	525	520		
VI.	Pharmacology inc. Materia Medica and Toxicology	240	216	175-200	200	4 to 5	—1
VII.	Preventive Medicine and Hygiene	120	54	170	170	3 to 4	+2½
VIII.	General Medicine	560	558	640	640		
IX.	Neurology and Psychiatry	150	126	160	160		
X.	Pediatrics	180	144	180	180	20 to 26½	+1½
XI.	Dermatology and Syphilis	90	72	85-100	90		
XII.	General Surgery	560	396	In accordance with present dist. (see p. 46)	470	13 to 17½	—½
	Orthopedic Surg.	45	72		45		
	Urology	45	36		45		
	Eye	50	54		50		
	Ear, Nose and Throat	90	54		90		
	Roentgenology		36				
		790	648		700		
XIII.	Ostetrics	144	144	151	150	4 to 5	—1
	and	96	72	61	60		
	Gynecology	240	216	218	210		
	TOTALS	4,100	3,600		4,040	76 to 100	

*The curriculum at present in force is on the per cent basis but differs from the suggested curriculum in per cent allottment.

It will be noted that a variation of about 25 per cent. is allowed, and also that in the broad fields of medicine and surgery no specific allottment is made for these subdivisions or specialties. Thus, each school may work out its own schedule with a very free hand and present electives or not as it thinks best.*

*Committee on Education and Pedagogics: Hugh Cabot, chairman; A. C. Abbott; Burton D. Myers; A. S. Begg, and Ray Lyman Wilbur.

DISCUSSION

DR. WILLIAM DARRACH, New York City: The curriculum of medical schools will be much more liberal five years from now; that it will allow students to have that freedom of working out their own individuality which Dr. Cabot has emphasized without becoming mere receptacles of knowledge that is pumped into them. Nothing is more impossible than the present curriculum. The only hope for the future is to do what Dr. Cabot has suggested, to take a sponge, wipe the slate clean, and start over again. If that idea can be carried out, we will accomplish a good deal. If we can arrange the curriculum by percentages or hours and pin the department down to certain topics, carrying out minor details, we can undoubtedly put these ideas into effect. As long as we limit teachers to the courses they are giving to undergraduate students, we shall find it impossible to prevent them from teaching those details in which they are most interested. If we provide some means or opportunity for teaching optional courses both to undergraduates and to graduates and university students, they will be more willing to confine their efforts to the fundamental lines of the undergraduate work than if we make that their only opportunity for teaching. For that reason, I believe that the best and most efficient methods of building up teaching work in the medical sciences lies in association with the undergraduate course, the undergraduate work, and all the other more special and more advanced courses, whether that is teaching for graduates in a general sense, or in a more restricted sense of public health work, university work, dental work, teaching nurses, and all the other branches which come under the same group. If we have a separate institute for every one of these separate branches of medical teaching, we will not have as able, efficient and economic a method as if we had them segregated together with a greater degree of latitude, which cannot be worked out under the more segregated special institutes.

DR. E. P. LYON, Minneapolis: We need to get the sort of efficiency which comes from the closely segregated departments, each with its own aims and its own group of men working toward these aims, and that leads to some of the difficulties which have been pointed out this morning. It is hard to make a perfect picture of the whole. The parts stand out too much by themselves. On the other hand, it does not seem to me that Mr. Pritchett in his report makes a new suggestion in regard to putting the work on the patient farther along in the course. Almost everybody must have thought of it and many people must have tried it, and the difficulty you get in there is that a person, like a doctor or doctor's assistant, must be approaching a subject without a proper basis on which to do the work, and the criticism which I have heard there was that all interests in the science of the subject are in the art of the subject. I do not think that

ought to be a criticism, but I have heard it from several. While we should approach this problem with the idea of getting men into medicine earlier, I do not think any iron-clad rule can be laid down as to the preclinical years and the clinical course, and we should have the earlier use of patients for instruction in practical medicine. Still, we should not destroy the laboratory departments and the scientific basis which they attempt to give. I have always been in harmony with the idea that the curriculum should be freed as much as possible of the rigidity mentioned by Dr. Cabot. There is rigidity in the very nature of things because we must include certain things. Course must be based on anatomy, physiology, pathology, etc., and you cannot go outside of these widely.

Our Minnesota program at the present time is founded on the theory that a certain amount of elective work should be given as far as possible throughout the course. It seems to me, it is impossible to begin that in the freshman year, because at that time the student has no particular knowledge of any of the departments which constitute a medical school. Beginning with the sophomore year, one-fifth of the time is devoted to certain studies, but every part of the course is elective, and that of the last six months is nearly all elective. The student gives one-sixth or one-seventh of the time for elective work. That has a good effect. It makes students responsible for what they do, and as Doctor Wilbur said, you cannot have too much in mind when you are dealing with these young men. If they are responsible, they are worth something. If they do make a good choice and use their electives to strengthen the lines on which they are weak, they will see to it that they get further knowledge on subjects in which they are interested, and you bring in the element of interest which is a pedagogic principle of great importance. This element of interest leads a limited number each year into research. The main thing to do is to make the students work, and you cannot make them work as long as there is a fixed curriculum with every department holding to its hours. The moment you do that there is no free time for the student. The development of the curriculum on the percentage basis ought to be better. It seems to me the curriculum as presented gives too much time to anatomy, but I happen to be a functioning animal instead of a dead one.

DR. DAVID L. EDSALL, Boston: It is evident that the paper of Dr. Wilbur and the report of the curriculum committee have met with a good deal of sympathy from many people who have been thinking about these subjects. I have had some experience and know of many others who have been thinking along these lines. About two and a half years ago I had a committee appointed which was really to have charge of cutting down or improving our curriculum, to make it more elastic and to eliminate as far as possible the first principle on which we should act. Of course, in getting into this sort of operation one always expects to meet with opposition from all sorts of persons, but, strange as it may seem, everybody agreed to the principle, but everybody objected to having his own time cut down. Dr. Cannon and I spent a great deal of time in preparing the way for a discussion of this matter with our faculty. Our faculty is a democratic body, and seventy-five or eighty men have a vote on all questions of policy. We thought we had a large job on our hands. We did what the king of France did, marched his columns of soldiers up the hill and down again because we found that nobody opposed the situation. We formulated

surgical operations on the number of hours, and we eliminated 25 per cent of the fixed hours in all years.

The next thing is that student has certain free time, Tuesday, Thursday and Saturday afternoons free, with the idea that we have enough time to arrange definite forms of advanced work for certain students capable of doing it. We can arrange for the medical students to do certain work in the university. We have arranged for group advisers to give each student an opportunity to be in such a group under one adviser for the first two hours, and another adviser in the last two hours, with two objects in view. The adviser is supposed to have a personal knowledge of each man under his charge, namely, his purposes, his advances, etc., by personal conference with him. If students can use their time in doing things better in a fixed time, if he has advanced the men mentally and they can get along better, they can use the free time with the aid of their adviser. These are the main things we have accomplished in regard to the fixation of the schedule.

Other things we have done are in consonance with Dr. Wilbur's views, namely, we have reduced the time of the minor specialties to the point where they all seem to contribute to the knowledge of general medicine and general surgery, and not give a man the opportunity to feel he knows anything about the practice of specialties, which are limited to thirty-six hours each in the schedule, and they are in the third year. In the four years we have assigned one month to pediatrics, one month to additional obstetrics, and the remainder to general medicine and general surgery and elective work, two months being free for a man to elect what he sees fit. We have selected 15 per cent of the high class men who were passed on by the Administrative Board, and this may leave the whole fourth year free for elective studies and they may concentrate on one or more subjects, provided they take a sufficient amount of general medicine and general surgery which we consider necessary to give a man the M. D. degree.

There are some radical changes in the program. We have cut down the fixed time in some years 30 per cent. It gives a great deal of freedom to the student to perfect himself in those things he must learn or to use better mentality to go ahead of the other members of the class. It does quite the opposite as compared with what was done before. The interesting part is that it went through a large faculty with almost entire approval because everybody had been thinking about it, and we were not as radical as we thought. Everybody else agreed with us. It exemplifies what the Committee on Curriculum and what Dr. Wilbur have been expressing as being the somewhat general feeling. My personal feeling has been very strong and is in accord with what was said by the preceding speakers. It has been absolutely necessary to standardize.

In past years the Council on Medical Education and other bodies interested in medical education have done most valuable work in improving the situation that was in chaos and disgraceful in many particulars. I do think it has now come to the point where we have to meet what nearly always happens in any good movement, namely, the movement goes so far that it is altered and checked.

The chief effect in talking with many intelligent students—and I have chosen those students who are interested in the practice of medicine, and not those getting the best type of medicine—is that it has taken away initiative, made them feel dependent for four years, or subject to orders

from the faculty or from the powers above, and they have no freedom of choice themselves. The intelligent student in the college, whose waste of time is largely his own and who tries to know what to do with it, learns responsibility and how to make a choice and learns how to progress in an intelligent way towards a purpose. He comes from the best colleges, goes into the best medical schools, and avails himself of the primary school plan and wants to work at anything that he is ordered to do. By the time he reaches the third or fourth year, while he may not have lost the mental habit, he may have lost his initiative and resourcefulness, and I believe that is one of the important factors in producing a man who, as Dr. Billings said last year, even though he may be intelligent, very often does not seem to have the individuality, initiative and resourcefulness he should have. We have to teach him that. He should have the opportunity of learning to be a man rather than merely being guided during the course of his undergraduate years in a medical school.

The other things I want to speak of are of minor importance in connection with the changes we have endeavored to make. In the first place, we have pushed back clinical teaching. In the second place, we have tried to a certain extent the concentration system which in the earlier years was tested in our faculty. With reference to anatomy, instead of running it only the first half hour, we run it into the second year and give opportunity for more work in anatomy in the third year, and in the second year term we teach applied anatomy. I would emphasize that this is being taught in immediate correlation with clinical surgery and clinical medicine, and some of the teachers in clinical medicine and clinical surgery are also engaged in teaching anatomy. We have done likewise with pathology. We have extended pathology through the second year into the third year with the idea that the course in pathology relating to anatomy must be in immediate correlation to the clinic, and not taught alone as a separate block subject. We have retained the block system to a large extent, and the other subjects already have a separate place. We have correlation in neurology, pathology, anatomy and physiology, with teachers in twelve subjects. We have introduced men well versed in the medical sciences into some of the other departments who are qualified to do the work. We not only have the correlated scheme between individuals in the departments where there is responsibility in engaging in the work, but in teaching one of the medical sciences and also certain clinical subjects. I have, for instance, two men in the physiology department serving for a year who make the wards at the Massachusetts General Hospital this year. That has resulted in combining not only the teaching but also research between the two departments. That is only an example of what is being done in a number of different ways.

Dr. Wilbur spoke of the duplication of subjects. That has been one of our worst faults. It is difficult to overcome. We are attempting to overcome it by having combined exercises, namely, a certain amount of medicine and surgery. A considerable amount of pediatrics and medicine may be taken up once instead of doing it twice. We are already gradually increasing the amount of exercises given combinedly for certain gastrointestinal conditions, like gastric and duodenal ulcer. Medical men, surgeons and pathologists will teach it together at one time. In cardiac irregularities the physiologists will give the physiology in relation to cardiac irregularities, the pathologist will give the pathology, and the clinician

gives his discussion of the subject. By a slow process we are attempting to eliminate as much as we can repetition in the different departments, leading to an excessive loss of time and a good deal of confusion in the minds of the students, because the subjects are presented differently by different men.

DR. A. PRIMROSE, Toronto: In the University of Toronto we have a somewhat different arrangement in our medical course. Instead of having a four years' medical course, we have dovetailed that up with the two years' premedical course and have called it a six years' medical course. That has helped us in some respects to solve some of the problems you have discussed here today. In addition to the former entrance examinations to the university which admitted students of medicine, we have required an extra year preceding the course in medicine, requiring a student to take up certain subjects in which he has to pass an examination—English, mathematics, Latin or one modern language. In the six years' course we have introduced methods of option, and that has helped to a considerable degree in meeting the defects regarding the standardization of students. It is an attempt to meet the problem which has been raised here today of putting all students through exactly the same mill, and not giving an opportunity for the development of the individual. As it worked out, we now have students in the third year who have begun their course under the new system in the six year course with options. The options do not represent a very large percentage of the actual number of hours in the year. The student is guided in his option by the class adviser. A system first introduced in some of your American universities, and which we are finding works out exceedingly well. The advantage is that the class adviser will permit students to take certain options. After the first year the options are difficult to select for the student, as the class adviser goes on with his three preliminary years he will get to know the ability of the student, and when we come to the final years a man is not allowed to take options unless he has obtained a certain standard in his work. If he has not attained that standard he is required to repeat his work or do work in the year in which he has entered in addition to others. This gives opportunity for the brilliant student to do better work, and the man who is below average to come up to the average, and it has helped in allowing the individual student to develop.

DR. H. GIDEON WELLS, Chicago: In making changes in the curriculum, one fundamental principle that should always be considered is that the medical student is a student throughout his life. Under the present curriculum he spends two years on the fundamental branches, and after he graduates he has his whole life to improve his clinical knowledge. Difficulties arose in previous years from the crowded curriculum, and lack of opportunity for original work and for initiative. Since we have introduced the quarterly system we have given opportunity for election. He can make up his deficiencies brought about by illness or by the necessity of having to earn a living. We have been deeply impressed with the value of the quarterly system in many particulars. Our medical plant, our clinics and our hospitals are in operation the entire year. The material is there, and if it is not used it is wasted.

DR. C. R, BARDEEN, Madison, Wis.: I am heartily in accord with the general principle of easing up the curriculum. In the premedical courses too many grammarians are teaching, so that when the student gets into

clinical medicine he finds his grammar too complex to use and he gets along with a sort of stuttering language the rest of his life, instead of having simply grammatical principles so that when he talks medicine, he talks it fairly logically. Anatomy, physiology and hygiene are very much neglected, and I wonder if it would not be well to start the student to learn normal anatomy. The biggest drawback in studying medicine, particularly anatomy, is that more mistakes are made by not taking off the clothes of individuals in studying them than in any other way, and when the student is turned out does not know what the human body does because he has it pretty well clothed. If it is possible to get practical training in physiology, beginning with the tedious dissection of the muscles, it might be a good thing. It should be required of all students of the first year to dissect the muscles and study the skeleton an hour of two a day in the gymnasium as voluntary workers. Along these lines, we may get a good deal of hygiene into the earlier years of study when the normal subject is being studied, and the physician thus gets a better training in a most neglected field of medicine, the field of normal activities of the body. Until a knowledge of the normal is seriously taken up outside of the preclinical years, as in obstetrics, we will be better off if all practitioners have training and were given a thorough knowledge of the healthy body.

Dr. Alexander C. Abbott, Philadelphia: That the medical curriculum developed during the past fifteen years is the result of a most important experiment, no one will doubt. The experiment was begun when there was no uniformity, no very definite ideas as to what should constitute a correct medical curriculum. The result was that medical education was rather chaotic. It was suggested about that time that some fundamental consideration and instruction be given, and the next step taken was to outline the fundamental instruction as given in our medical schools, which was concentrated more and more into the first two years, and at present it is a shock to find many things taught in such a detached manner that the medical student has not a realization of what it all means, and he does not understand that he is studying medicine until he gets to the clinical years. It is very easy and very agreeable to teach the preclinical subjects from a purely scientific standpoint. Very fascinating courses can be given. I am thoroughly convinced that the time has arrived when the points made by Dr. Wilbur and by Dr. Cabot can be taken seriously. There is need of more elasticity in the medical course. The medical student must be made to realize the relationship of the underlying sciences to the solution of clinical problems from the moment he enters a medical school. I can see no reason why patients should not be shown to the first year medical student as they are shown to the third year medical student, because unless premedical instruction in biology is made practical, the student who has not had instruction in general biology cannot appreciate what is going on in the animal body when he sees it. A competent teacher of the underlying sciences in the medical course can and should point out the relationship of the underlying sciences to "what is the matter with the patient," and by doing so it would be possible for the two subjects to be made infinitely more interesting than they are at present. I do not wish to be misunderstood, but in teaching the underlying or premedical sciences, the department should be limited entirely to applied science. I would favor that the departments of psychology, biological chemistry, bacteriology and pathology be given an opportunity to develop to the end that instruc-

tion in these sciences in the medical course be applied to service from the time the student enters the medical school until he leaves it. More time should be allowed for the student to develop along the line of least resistance, to take up those things that interest him most. The plan Dr. Edsall mentioned of having advisers is a common plan in most colleges. It is an excellent one. The function of the adviser should be to keep the student from specializing, giving him the broadest view of medicine as a whole. If he wants to become a specialist later on, give him every opportunity to do so. In the four years of the medical course the student should be taught medicine.

DR. NATHANIEL ALLISON, St. Louis: In Washington University we have for the last two years been endeavoring to have a curriculum which gives the student more chance for initiative and to encourage him to develop resourcefulness. Dr. Edsall has covered all the points of such a curriculum so well that I have nothing to add to his very admirable presentation of the modern point of view on this subject. We have struck an additional idea which might serve as a suggestion. We propose to have a required course called a co-ordinated course. We have not decided how to give this course, but the idea is that the preclinical man should give certain things in medicine, and the medical man should give certain things in physiology, and so on, interchanging. This would be a required course throughout the four years, indicating to the student the value of some of the things he sees in the laboratory and in the clinic from the standpoint of correlation.

With reference to choosing the time in electives, we have been rather struck with the tendency of the student when he has followed in his fourth year to choose some form of elective which has definite practical value to his rather uniform point of view. The selection of advisers would, perhaps, tend to stop him in this matter, and it has been our hope that as we develop this curriculum we can encourage the men in their free time to go back into the preclinical branches in their fourth year. We feel this would be of greater value to them than to go into some specialty of medicine or surgery.

DR. C. A. HAMMAN, Cleveland: At Western Reserve University we have reached the conclusion that more elasticity in the curriculum is necessary. The rigid curriculum has been sufficiently emphasized. More opportunity should be given for initiative, and in the last year particularly electives should be allowed. Certain clinical periods have been mentioned to allow the granting of the medical degree to men who wish to go into laboratory branches. I think we should give opportunity in the form of electives to those men who wish to pursue laboratory branches. Needless to say, there is a dearth of laboratory men, and if a student in his second, third or fourth year manifests a disposition to go into the laboratory branches, he should be afforded an opportunity to do so in the choice of electives, and that while there should be a minimum requirement in order to grant the M. D. degree, he should have an opportunity of going into these branches. One of our great faults is a lack of correlation between the preclinical and the clinical branches. The preclinical laboratories have been practically isolated, and the connection between them and the clinical work is at a minimum. This should be overcome. How it is to be done we have not yet made up our minds, but the isolation of the preclinical branches is something we should contend against. There

should be greater correlation between them and the fundamental branches.

The statement was made by one of the speakers that at the end of the medical course or at the end of the intern year the student should be able to make a guess as to what is the matter with a patient. I think we as educators will agree that at the end of the medical course or at the end of the intern year, which I regard as a necessity for the student, he ought to be able to make more than a guess as to what is the matter with the patient.

One detail in the curriculum proposed by Dr. Cabot, if I remember his figures rightly, impressed me, namely, the disproportion between anatomy and physiology. I think the disproportion is too great. There should be more physiology in proportion to anatomy.

Dr. Walter L. Bierring, Des Moines, Iowa: Basing my remarks on observations made in regard to evaluating the product of medical education, it appears to me we still have something to learn from the older civilization. Dr. Primrose spoke of the Toronto plan. There should be a closer affiliation between the premedical and the medical sciences, a greater need of supervision by the medical schools over the premedical scientific studies. It seems to me, there is a distinct advantage in introducing English and French in our combined six year course in this country.

Another point brought out so frequently is that the proper development of clinical teaching is largely based on the development of the medical sciences and their closer affiliation with the clinical department. It is unfortunate, indeed, that there is a distinct line of division between the first two years and the last two years, and it is gratifying to note that this is occupying the thought of the educator and that an effort is being made to bring these years closer together; yet there is a tendency in the discussion to attribute rather to the clinical heads the power of teaching medical physiology, pathology and the other fundamental branches when, in reality, all investigative work in the clinical departments should be in charge of the heads of the fundamental branches. Unless something is done to make the teaching of the fundamental sciences more attractive, to bring about closer affiliation, there will be a defect in the general training of the medical graduate, and in a short time the teacher of the fundamental sciences will be only a matter of history.

I think it entirely wrong to gauge the standards of the fundamental teacher on pure observation. He should be more properly placed on a clinical basis and his status and emoluments should be more in keeping with the clinical teacher than with the pure teacher. I am inclined not to attribute to present economic conditions entirely a lack of general practitioners or of rural practitioners. I think in part this may be laid at the door of the present curriculum.

While I hesitate to inject into this discussion anything about the cults or the sectarian practitioner, there is no question that the present tendency to specialism and the reduction in the number of general practitioners is opening the door for the cults and the irregular practitioners. The irregular practitioners are going to enter at the back door, as it were, and by sheer force of numbers become a menace. The tendency of a closer affiliation between the fundamental and clinical branches, the development of a more general plan of medical training, will form one of the solutions for the menace of this sectarian problem.

Dr. Charles P. Emerson, Indianapolis: The reason we find the

curriculum so rigid is because we have the state boards of medical registration as a legal whip to keep us in line. In the University of Indiana we have applied again and again for greater elasticity in the course, but students of the state university have a distinct feeling that the university and the state board of medical registration and examination should play ball together. I talked to two or three deans and asked, how do you get such elasticity and so many hours for students to work? They said, we pay no attention to the state medical board examination. That is the way the western state universities feel about it. We must train students for state board examinations, and if we wish to pass them we must put so many hours into the curriculum with specialties when it takes away hours that we would give students with optional work. A member of a state board of examiners said to me: "Dr. Emerson, I am not a medical educator; if I were, I would not pay any attention to what the state board said."

I am fully convinced that if we had not had that great influx which came from a group of mushroom schools which inundated this country thirty years ago, we never would have had many of the problems to contend with that are arising today. Twenty years from now, when mushroom schools will no longer exist, these questions will not arise.

It is a mistake to lay too much emphasis on the premedical and preclinical branches. It is only a means to an end, the only means we can see. It is a very efficient means, but unfortunately a temporary means, and if we will consider the curriculum with the view of future generations, we will hand down to the future generations a much better curriculum than that which we are planning now.

Dr. Louis B. Wilson, Rochester, Minn.: I am heartily in accord with the statements made concerning the easing up of the medical curriculum and of keeping the number of clinical specialties upstairs. From the standpoint of the graduate school, I may say that we of the University of Minnesota can thoroughly confirm your suspicions that things are not right with the graduates who are being turned out from the undergraduate schools. They lack individuality. They come to us in a most receptive attitude, with very little initiative. They know such a lot of things that are not true. They know so little of a few things that are worth while, and most of all, they are most uninteresting men. They lack culture. They know nothing of either art or literature. They know little of music, and nothing of history and of language. All these things they ought to know as gentlemen and as citizens in an intelligent community.

In the Mayo Foundation we are basing our experience on taking in from fifty ot sixty men each year who are picked almost entirely from the upper third of the graduating classes of other institutions. Most of them are from American schools. We see a great difference as teachers in an American school. We have come to realize that it is necessary for us to direct attention more and more to the essentials in the preclinical branches; the things that are worth while; the things that men must have as a perfect working knowledge in order to handle clinical work. It will be necessary for us to designate the things we consider essential, not that we shall ask that these things shall be taught in the undergraduate school, but insist that the men shall obtain a thorough working knowledge of them.

I was interested in what was said in regard to the irreducible mini-

mum of essential things in the preclinical branches, and I would suggest the appointment of committees consisting of representatives from general surgery, general medicine, obstetrics, and from the preclinical branches to take up the serious consideration of the things which are actually of value and which should be taught in the preclinical chairs. This, I am quite sure, will eliminate an enormous number of things which are now taught and which should be taught in some places and which, at the same time, may be valuable in the first two years of medicine. I really believe that such committees as these, one for anatomy, one for physiology, one for pathology, one for biochemistry, one for bacteriology, etc., would have influence. I should regret to see their recommendations made an absolute requirement, but they could do an enormous service to the profession of medicine. I am quite sure that if they would designate what seemed to them the essential things, they could omit all those things that are non-essential. That certainly would include a knowledge of how blood returns from the end of a man's big toe. A working knowledge of physics and of the dynamics of circulation is not included in most schools today, judging from the product which comes to us.

I wish to make one further plea for the teaching of a foreign language. I am really sorry that I have to disagree with the chairman on that proposition because, it seems to me, we are not getting a lot of original communications in medicine written in shorthand or in typewriting. We are getting a lot of valuable original communications in medicine in German, in French, and in Italian, and the man who knows but one language is a narrow man in his field. He should be able to get those things without their filtering through translations. It is not the place of the medical school to teach these things. That is quite true. They should be started bteween the years of eight and twelve.

Dr. Frank Billings, Chicago: I think the curriculum needs modification. I would dislike very much to have it "shot to pieces," as one of the members remarked to me, because that is not constructive work, and it certainly needs a constructive change. The curriculum of the medical school needs modification chiefly because teachers are specialists in every branch, and because of that fact each branch is taught separately and distinctly and is usually unrelated to any other subject in the curriculum. In consequence, our students are unable in many instances to fit the bricks, so to speak, into the general structure of their education. We, as teachers, are getting rather tired of the consideration of the amount of time which should be spent on the respective studies rather than getting down to the fundamentals of pedagogics. Mr. Henry S. Pritchett pointed out how we should do things which we have left undone and which we should do. He makes a comparison of the technical training of engineers and of medical men. He points out the relationship between all subjects. Fundamentally we want him to turn out an educated, cultured individual. We must do it because he is not only to be a doctor but his relationship to the community must be such that he must be broadminded and sympathetic, and be able to advise people on all subjects relating to their welfare; therefore, he must be a whole time practitioner of medicine, and these men from medical schools do not need to be specialists in psychology, in bacteriology, in anatomy, in pathology, in physiology or in chemistry. The subjects should be so taught that they are related one to the other, and it is a mistake that we have separated the departments of the fundamentals

of medicine gradually from the clinical branches, so that there is no real co-ordination of these branches; there is no mixing of the faculty so that they may rub against each other and have a broad understanding of the work of each.

In the clinical branches, there seems to be a tendency to overspecialize the student. What we want to do in the fundamental years is to so teach the student that he has a fundamental understanding of the normal human body, that when he gets to the clinical years he can recognize evidences of change in anatomy and in function. The main thing for us to do is to train him how to recognize these things, disregarding the treatment the patient gets. If we spent more time on that and less on training students how to treat patients, giving them a broad view rather than a technical training, we will accomplish much more than we have so far done, because all the further work of the practitioner of medicine is in a constant study of how to take care of patients, and if he is grounded in his fundamentals he will recognize what he must do to detect a morbid condition.

There will leave the schools and hospitals this year approximately three thousand young doctors. These doctors should be so trained that they will be able to recognize the real condition of from 80 to 85 per cent of all the people that come to them. They will not be able to treat 20 per cent that will require the diagnostic skill of a thoroughly trained specialist. In other words, we need 80 per cent of these very well trained men and 15 or 20 per cent who should take post-graduate training for the treatment of special diseases. If we will consider these principles, we will not need to spend so much time on the number of hours or the percentage of time allotted to this and that study. For instance, it is very important to allot a certain percentage of time to pathology. We should not place any restriction on it, because students should study pathology from the time they are freshmen until they finish their intern course, or until they finish their four years of medicine. Pathology is the foundation of all medicine.

Rev. Charles B. Moulinier, Milwaukee, Wis.: The limitation of a curriculum in any kind of teaching in the whole field of human education must be based on the amount of knowledge and the intensity with which that knowledge is grasped by the mind. If the medical profession goes on growing as it has in the last ten or fifteen years as a teaching body, you are going to have textbooks for the undergraduate, and permit me to call that the bachelor degree of knowledge, and another set of textbooks for the higher degree of knowledge, and finally books on the degree of doctor of knowledge. I find medical students wasting hour after hour in reading reference books. I have looked, perhaps not exhaustively, in vain for a real textbook which gives the amount of knowledge, say a minimum, that is certain or as certain as the profession can make it. You have to crystallize knowledge into certain, uncertain and less certain, or merely probable or hypothetic, and if you will do that in a set of textbooks for the undergraduate student, you will not crystallize his mind, you will just give him a certain share of knowledge which he will grasp and hold and carry through life, and that knowledge must be classified as facts, as principle, and you reason out your diagnostic knowledge. Following the suggestions that were brought out here, and evidently very strongly in Dr. Pritchett's article to which reference has been made, the textbook should contain case study. Case study in law is a fixed thing. Case study in engineering is accepted as the best method of teaching engineer-

ing, alternating between theory and practice. I believe it is called the Cincinnati idea which has been advocated here. A textbook written along that line is an easy approach to the patient in the clinic on the part of the young man without any certain body of knowledge of facts, of principle, and diagnostic reasoning following from that, so that in that kind of textbook you will find no stereotype knowledge which is now so prevalent in the medical profession. These textbooks will have to be rewritten every year, be up-to-date every month, if possible. In three or four or five years these books in the hands of live teachers will enable them to do remarkable work in medical education. And that has suggested another thought that is most fundamental in this discussion, namely, that you will not teach medical students unless you are teachers. Everybody knows that a teacher is master of the textbook. A superior textbook teacher is the maker of mind, and if you have this instrument that belongs to all phases of teaching, a careful, well written textbook, and put into the hands of carefully trained teachers, your output is bound to be better and fixed.

As a parting word, let me say that if it ever becomes possible, and I know the medical profession is studying it, for you to grade education according to intensity of knowledge, the bachelor, the master, and doctor of knowledge, you will have covered the whole field as most of the other pedagogic fields are covered today.

MR. WALLACE BUTTERICK, President of the General Education Board, New York City: I have been a student of education for twenty years. These papers and discussions are the most hopeful thing not only for medical education but for general education that I have heard. One fault in teaching is that men are set to teach subjects rather than to teach men and women. A man thinks he is set to teach a subject when really his business is to get acquainted with young men and young women and teach them to find out where they are mentally, and lead them out into such individual initiative and capacity for initiative as will really make educated men.

Another thing that impressed me favorably as being allied to that is the disposition to get rid of the rigidity of the curriculum. Some years ago I had the pleasure of meeting the late Mr. Bryce. After Mr. Pritchett was introduced to him at a large educational gathering, I was introduced to him, and the man who introduced us both was a powerful man but not an educator. He said to Mr. Bryce that these two men are doing more to standardize education in America than any other two men, and Mr. Bryce and I passed on, and then Mr. Bryce turned to me and said: "standardize education, what does he mean by standardization?" I replied, "he does not know what he means, and I repudiate what he thinks he means." Mr. Bryce said, "good for you, for standardization is the curse of education." I thought of that a great many times. Rigidity is a much more felicitous word than standardization, for standardization connotes the thought of thoroughness of a curriculum that makes for the development of intellectual power. Rigidity of curriculum is not peculiar to medical education. We teach the sciences of physics and chemistry, and a man who is not versed in physics would never know it was intimately vital and integrated with chemistry. Mathematics is divided into arithmetic and algebra, with trigonometry, etc., which, after all, is general mathematics.

It is one science. The thought of integrating several sciences into one science is most welcome, and I hope you will keep that point in mind, for after all we are set to teach men and women so that by having the mastery of their minds and having the quality of moral earnestness and capacity for sustained education, they may address themselves not only to your problems but to the problems of all callings.

TEACHING FACILITIES

J. T. McClintock, M. D.
Chairman Committee on Equipment
IOWA CITY, IOWA

From the standpoint of medical education for the undergraduate, the teaching facilities must be of such a character as to make it possible to carry out the established curriculum in the most practical and advantageous manner. The facilities should be such as are helpful in impressing on the mind of the student the things he should know—to provide means for teaching the necessary technic. Yet, they should be of such a character as to conserve the student's time so far as possible by relieving him of unnecessary routine and permit of greater attention to the essentials. The difficult questions, however, are "What is unnecessary routine?" and "What are the essentials?" in the education of the average student for the general practice of medicine. To these questions no entirely satisfactory answers seem to have yet been found. Undoubtedly the curriculum should be the first factor in determining the nature of the necessary facilities and it, therefore, naturally follows that only as the subject matter of the curriculum is the more rigidly fixed as to character and method of presentation can it be possible to state in detail what the facilities must be. However, what seems to be needed most is not increased rigidity but more liberality in the development of a medical curriculum.

The rapid growth of the medical sciences has overwhelmed the teacher with a mass of information which appears to him as necessary for the student to obtain. Yet, it is generally recognized that the aim of proper teaching is not only to impart information, but it must encourage and develop in the student, so far as possible, the qualities of originality, initiative and resourcefulness, together with power of observation and interpretation. What seems to be needed, therefore, is a more careful selection of the facts which are necessary for the student to acquire, the alteration of old and the introduction of new methods which will encourage and develop those qualities, which, if gained, will insure the student's independent growth in medical knowledge. To accomplish this, a considerable modification of

the present arrangement and requirements of the medical curriculum will be necessary, and in such readjustment there will be a considerable alteration in what is now regarded as being the proper facilities for teaching even the better established laboratory subjects.

Interwoven with the curriculum as a factor in determining the teaching facilities is the adequacy of the teaching staff. While it stands to reason that a certain amount of knowledge must be acquired by the student, the method of imparting this information in an acquirable form will depend on the ideas, the resourcefulness and the experiences of the instructors in charge. Few methods can be said to be universally successful. The facilities and equipment must vary in detail, and a standard which does not permit of sufficient variation to allow for reasonable changes in teaching methods is deterimental rather than helpful.

There are, however, certain well recognized fundamental things which are essential in providing the proper facilities for adequate teaching, and in these certain general requirements may be established. On request, the Committee on Equipment of the Association of American Medical Colleges has attempted to revise the minimum standard of equipment as published in 1908 for the laboratory subjects of the first two years of the medical course. This revision will be presented to the Association for adoption. The Committee fully realizes the difficulties in the preparation of such a list of what a department might have for its greater efficiency. The Committee realizes that what appears to be essential to one instructor may not have the same importance to another. Incomplete, therefore, as such a list must be when compared with the equipment of some of the better laboratories, its justification is based not only on its helpfulness in giving to those who are called on to inspect an institution an officially adopted minimal standard, but also it may aid the person in charge of a less fortunate department in forcing a more favorable support from the governing board.

As the general requirements for the laboratory subjects seems fairly established, and as no effort has been made to list what a department might have, it would be of little value to read the list which has been prepared. There are, however, a few general interdepartmental problems which have been presented in the preparation of the report and which may open a field of discussion.

FINANCIAL SUPPORT

Having once determined on what the proper teaching facilities should be, then the liberality of the financial support will largely settle the extent to which the standard set will be reached or excelled. The amount of money involved in support alone, without consideration of the original investment in the plant and its necessary expansions is far too large to be met by collected fees, and the maintenance of medical education must depend on increased endowments, or, what is more probable, on public support, on the basis that it is a part of the duties of the state in connection with its control of the public health. So varied are the conditions under which medical colleges are placed, and so different the price which must be paid for the same facilities in different localities, that nothing but a most general statement, such as "departments must receive adequate financial support for salaries, equipment and running expenses" can be made. To determine if this is being done, one must judge the facilities provided, the equipment, and the character of the teaching staff in relation to the amount of work which is expected of the department.

TEACHING SPACE

As with financial support, so also is it quite impossible to say what minimum total amount of teaching space each department should have, even with classes of a given size. Much can be done with a small amount of space by proper arrangement of schedule so as to permit of cooperative use of a common student laboratory by different departments, or by division of large classes into small section limited only by the possibilities of schedule arrangement and the number of instructors. The space problem, nevertheless, is a very acute one in many colleges.

The Commttiee on Medical Education of the American Medical Association not long ago published the statement that there is plenty of room in the colleges listed as Class A to take care of a rather large increase in attendance. While this may be true when total resources of all Class A colleges are considered, it seems that the distribution of available room is not in the territories where there is the greatest desire for admission to medical courses. In some places, at least, overcrowding must be prevented by some form of limitation of admission or else a very

great increase in the teaching facilities over the present ones must be made. It has seemed best, therefore, that some standard of minimal space requirement is needed if the efficiency of teaching is to be upheld against the pressure caused by the demand of large numbers for admission and without the possibilities of sudden expansion. Such a condition must result in inefficiency of teaching, and it is necessary either to limit the attendance or standardize the space requirement.

The committee has, therefore, included in its report the following statement relative to space—"They (the laboratories) should be of such size for microscopical and chemical work as will permit of approximately 18 square feet with 3x4 feet of linear table space per student occupying the laboratory at one period. When separate tables are used, as in the dissecting room and in the departments of physiology and pharmacology where group methods prevail, approximately 40 square feet of floor space should be allowed per table or group of from two to six students." Additional space for necessary rooms such as office, preparation, museum, research, etc., are also provided for in the report but without specifying either number or size.

WHAT SHALL THE STUDENT BE REQUIRED TO FURNISH?

As to the ordinary, less expensive material, such as dissecting instruments, slides and cover glasses, stethoscope, textbooks, etc., there is, of course, only one opinion. There are, however, a number of more expensive pieces of equipment which the student should have while taking his work and which he ought to have when he goes into practice for himself. For such common instruments as a microscope, hemacytometer, sphygmomanometer, etc., the general opinion is that it would be a good thing for the student to possess his own, but there is much hesitancy in requiring him to do so.

Is it not a part of the duty of the medical school to see that the graduate goes out into practice with the recognized essential material equipment as well as with a proper amount of information? It is generally recognized that such instruments as above mentioned are essential in the proper practice of medicine. It is also recognized that such instruments are of much greater value when the user has become familiar with a given one, and personal ownership will ensure more careful and extended use during student days, and after graduation the established custom of

usage is more certain to continue. Besides those instruments which the student first begins to use in his preclinical subjects, there are others in his clinical courses, the securing of which, should be supervised more carefully by the departments. A manager of an instrument supply house informed us that the tendency on the part of the newly graduated was to invest largely in unusual instruments to the serious neglect of those which would be of most use to him. The responsibility for this state of affairs lies on the medical school. It could well be corrected by more careful instruction if not by actually requiring the student to purchase the necessary equipment while in school.

The only argument which has been advanced against such a plan of greater student ownership of some of a physician's equipment is the possible hardship due to the added expense. In dental colleges where tuition is as high on an average as in medical schools, students are required to furnish instruments which have a total cost during the three or four years' course of from $400 to $500. A sum much larger than that would be required to secure the more necessary things which are needed by a medical student as well as after graduation. Requirement for student ownership of some expensive equipment is already in effect at some schools, and it would seem that such a requirement, which is so obviously for the good of medical education and practice, should be made universal. The college should, of course, provide the instruments if the student does not, and it is left in this form in the list of equipment.

THE MEDICAL LIBRARY

It is not our purpose to discuss what is the best method for library instruction but to call attention to the problem of what arrangement is best in order to make the library a most usable facility. I was told by one college inspector that on asking to see the library he was informed that the college had not thought it necessary to develop a library as the students had access to one of the best medical libraries in the country. The fact that the library was located some miles away seemed to make no difference.

A most vital and important factor in making the library a useful facility is its accessibility. To be of greatest value it must be close at hand, and unless it can be reached readily from

the departments it is to serve, it loses its value as a working library and becomes a place only for an occasional visit. When one considers the problem in its widest aspect, equal services to all, the economy of space, lessened expense and fewer duplications of books, a central or general library is best, providing it is near enough to the parties it is expected to serve to permit of easy and quick access.

With the growth of the medical schools it has become necessary to have larger and larger laboratories—the discontinuance of the one building and its replacement with separate buildings for the several departments, which for architectural reasons or from lack of building space have become more widely separated. The central library, therefore, is less and less effective, and ceases to be a functioning part in the work of the separated departments, and the departmental library becomes a necessity. No doubt this is a disadvantage to some who desire to search through the literature in connection with a given problem, as advancement in any one field of the medical sciences is interwoven with the progress in other fields to look up the literature may require visits to several departments. Nevertheless, it brings the parts of the library to the places where they are most used, and the inconvenience to some is far outweighed by its greater usefulness to the work of the individual departments. Unfortunately, however, the departmental library is too often open to severe and just criticism. In some cases it is crowded into a small room accessible only to the department; in other cases it may be in a private office; too often it is poorly supervised and without reading tables or proper light. If the departmental library is to be maintained, it must be as a part of a central library, with similar care, supervision, and access at regular hours to all who have occasion to use it.

When allied departments, such as physiology, physiological chemistry and pharmacology, or pathology, bacteriology, and hygiene are housed in one building, a common library room for the group is probably the best plan as it meets most of the advantages of the departmental library and it is easier to overcome most of the objectional features.

DUPLICATION OF FACILITIES

Among the problems that of duplication of equipment is one

which gives rise to a very large amount of difficulty. It is not solely one of expense or of more economical use of space, but there are certain factors in connection with the problem which are of a much wider and more serious nature. A certain amount of duplication in equipment of different departments is absolutely necessary, and the money thus spent is for economy of time and energy and to the greater efficiency of the whole college.

It is also true that the greatest possible liberality in expenditures should be made as it is impossible to calculate the benefits in the progress of science on the basis of a percentage of original investment. However, as limited and not unlimited funds is the lot of most institutions, any saving which can be made by proper cooperation or pooling of interests between allied departments in securing expensive and infrequently used equipment will be to the greater good of the whole institution as well as to the departments. Unfortunately, this is not done as often as it might be because of departmental ambition.

A more vital problem than mere expense now lies in the complete duplication of fundamental laboratories in the clinical departments. In the laboratory branches lies most of the science of medicine while in the clinical years is the "art of medicine." Most of the advances made in recent progress have been based on and are the results of the investigations carried on in the "sciences of medicine." This being the case, it may be quite natural for the clinical departments to desire to have attached, under their direct supervision, complete laboratories. It has been strongly recommended that the laboratory departments teach their subjects from the standpoint of pure science. To such an extent has the introduction of laboratories gone, and the working laboratory of the hospital is not here considered, that it is not uncommon to find clinical departments in the same institution, each having its own fully equipped chemical, biophysical, bacteriological and pathological laboratory, each in charge of trained laboratory specialists. It only requires a little enlargement and expansion in order to handle the preclinical course in each one of the several departments.

Two extreme possibilities seem to offer in contrast to the present plan. First, it is conceivable that the medical course does not really begin with the work which now constitutes the entire freshman year and most of the second year, but actually

starts when the student enters the clinical work at the third year or the latter part of the second year, and that laboratory subjects should be taught as pure sciences. If this is the case, would it not be better to group the so-called preclinical subjects entirely with other pure sciences in the College of Science and not with the applied sciences? Such a condition is hardly desirable, but it is in line with the present tendency.

The other possibility is to begin the clinical contact on the entrance of the student to the medical school and then to weave in with his clinical experiences the work which now constitutes our present preclinical courses, somewhat on the plan followed in the French school. The laboratory subjects could then be made a more concrete part of the clinical course: Pharmacology with therapeutics; anatomy with surgery; embryology with obstetrics; physiology with general medicine, etc. This may also be extreme but it would have its advantages, and is more desirable than the present tendency.

One of the most important effects of the present tendency is seen in the inability to secure trained men for the laboratory work of the preclinical years. The alluring influence of association with active practice and its prospect of greater regards cannot help but retard the recent graduate from accepting a position even at a good salary in which he ties himself to a teaching position offering little toward developing him into an independent worker. Important as it may be, it is not entirely the lack of financial reward that is responsible for the present decrease in the number of those who are willing to enter the field of pure physiology or pathology. The isolation of the teaching laboratory is taking away the thing which, worthy or unworthy as it may be, is guiding the ambition of today, namely—the immediate or practical application of one's work. While the true aim of science is the discovery of new facts, the ambition of the worker of today is in finding what influence these facts may have on the human race. Thus, in a profession so intimately bound up in the welfare of mankind as the medical profession is, and where the applications of the advances in science have been so far reaching in their effect, it is quite natural that the student finds himself carried into that field where he has not only the opportunity to work in science but also in the art of medicine as he may when working in the laboratory attached to a clinical department. This arrange-

ment also permits him more easily to step entirely over into the art of his profession, should he desire, than he can when his entire attention has been given to the pure science.

The present tendency of separation and isolation of the departments teaching the fundamental subjects and the development ad libitum of similar laboratories in connection with clinical departments is a form of duplication which must be regarded with considerable concern as to its ultimate effect on medical education.

MINIMUM EQUIPMENT STANDARD FOR FUNDAMENTAL SUBJECTS OF FIRST AND SECOND YEARS

COMMITTEE ON EQUIPMENT

J. T. McCLINTOCK, University of Iowa
C. M. JACKSON, University of Minnesota
A. E. GUENTHER, University of Nebraska

LABORATORIES

Laboratories should be provided for the work in anatomy, histology, embryology, physiology, pharmacology, bio-chemistry, pathology, bacteriology and hygiene.

These laboratories should be specially arranged and equipped for the particular needs of the department. They should be hygienic, well lighted, heated, ventilated and with adequate plumbing for gas and water according to the demands of the work. They should be of such size in microscopic and chemical work as will permit of approximately 18 square feet with from three to four feet of linear table space per student occupying the laboratory at one time. When separate tables are used, as in the dissecting room and in physiology or pharmacology where the group method prevails, at least forty square feet of floor space should be allowed per table or group of from two to six students.

Each department should be provided with sufficient additional space room for staff, for research, for preparation, for storage, and for such special work as may be required, such as injection room, balance room, dark room, lockers for students, museum, animal rooms, etc.

Accessible to each department there should be either general or departmental lecture and recitation rooms of sufficient size and number to accommodate classes comfortably and well equipped in the usual way for such rooms, including provision for projectoscopic work.

LIBRARY

The library should be located in immediate proximity to the departments served. It should have adequate reading tables and light. It should contain at least 2,000 volumes of standard reference books, a representative number of special journals devoted to the work of each department, and a periodical index journal to medical literature, preferably the Index Medicus. The library should be cataloged properly and be open at regular hours.

MUSEUMS

(See individual departments)

GROSS ANATOMY

1. Dissecting room, etc. (See Laboratories.)

2. Human cadavers sufficient to enable each student to dissect the lateral half of the body. Space and facilities for embalming, colored intravascular injections, and storage of cadavers.

3. Museum material, with adequate space, and proper cases for storage and demonstration, including:

(*a*) Mounted human skeletons; one for lecture room and one for every twenty-four students in the dissecting room.

(*b*) Disarticulated skeletons; loan collection for study of osteology (one set for every two students).

(*c*) Osteologic preparations and sections to illustrate gross structure of bones, ossification, etc.

(*d*) Wet preparations of the various joints.

(*e*) Injected specimens of the blood-vascular system.

(*f*) Preparations of central and peripheral nervous systems.

(*g*) Frozen sections through various planes of formalin-hardened bodies.

(*h*) Special preparations to show viscera and regional anatomy.

(*i*) Papier-mache, wax and plaster models to illustrate the various organs and regions.

(*j*) Wall charts of the various regions, for use in lecture room and laboratory.

4. Projection apparatus for lantern slides and opaque projection (to be available also for microscopic preparations). Complete set of post mortem instruments. (Roentgen-ray apparatus should be accessible for use, may be shared with clinical departments.)

HISTOLOGY

1. Laboratory for study of microscopic anatomy. (See Laboratories.)

2. Compound microscopes to be provided (unless required of students) so that each student is supplied with an instrument and complete outfit (two oculars, two objectives, double nosepiece, Abbe condenser, iris diaphragm, etc.) Additional microscopes with oil immersion lenses, mechanical stage, hemocytometer, etc., for demonstrations and staff use. Dissecting microscopes and binocular eyepieces also necessary.

3. Microtomes: One rotary microtome, one sliding microtome, and one freezing microtome; knives for paraffin, celloidin and frozen sections.

4. Paraffin oven with thermoregulator and accessories (gas or electric) for embedding purposes.

5. Glassware, reagents, dyes and instruments for making the various types of histologic preparations.

6. Loan collections of mounted slides (one set of at least fifty typical slides for every two students).

7. Histologic wall charts: at least fifty are necessary.

8. Projection apparatus (see Gross Anatomy).

EMBRYOLOGY

1. Laboratory equipped as for histology (same rooms may be used if schedule permits).

2. Microscopes, microtomes, paraffin oven, glassware and reagents, projection apparatus (as for histology).

3. Embryologic models, to illustrate the various stages of development.

4. Embryologic wall charts: at least fifty are necessary.

PATHOLOGY

1. Laboratory equipped for microscopic work. (See Laboratories.)
2. Museum. A teaching museum of well selected, well mounted, frequently changed, set of type specimens: at least 500, readily accessible. It should store after proper preservation and cross indexing all other obtainable specimens for research study.
3. General equipment same as for histology, 2, 3, 4 and 5.
4. A ready supply of laboratory animals, rabbits, guinea pigs, etc., and facilities for housing, feeding and caring for same.
5. Necropsy room or access to one with a supply sufficient to furnish a class in general pathology with fifteen necropsies on the human body.
6. Loan collection or unmounted material sufficient to furnish each student with at least 100 typical sections of pathologic change.
7. Projection apparatus (departmental or conjointly with other departments).

BACTERIOLOGY

1. Laboratories (see Laboratories).
2. A ready supply of laboratory animals, rabbits, guineapigs, etc., and facilities for housing, feeding and care for same.
3. Incubators, warm and cold. Stock cultures of pathogenic and nonpathogenic bacteria. Compound microscope complete with two eyepieces, Abbe condenser and three objectives, including oil immersion lens.
4. Facilities for making various culture mediums in bulk and giving instruction in medium making, steam and hot air sterilizers. Raw material for common and special mediums.
5. Glassware, etc., beakers, flasks, petri dishes, plates, test tubes, serologic tubes, pipets, burets, syringes—injecting and aspirating, reagents and dyes for making usual microscopic preparations, water baths, thermometers, apparatus for H ion determination, etc.
6. Each student should be supplied with test tubes, petri dishes, Bunsen burner, microme wire—straight and looped—stains, staining and mounting equipment, test tube rack and basket. Compound microscope and slides (unless required of student).

HYGIENE

1. Laboratory equipped as for bacteriology, including use and care of laboratory animals, anemometer, psychrometer, hydrodieks, air sampler, foot candle meter, and facilities for vaccinating for smallpox, Shick test, T—A for diphtheria, and typhoid immunization.
2. Library: In addition to journals called for under general head of Library there should be complete sets of U. S. Census Reports, U. S. Public Health Reports, and the better state, city, and public health association bulletins.
3. Opportunity for field work. Under definite agreement the following places should be open to students for study and report.
   (*a*) Water purification plant.
   (*b*) Sewage disposal plant.
   (*c*) Garbage disposal plant.
   (*d*) Milk { Pasteurization plants. Certified farms. Dairy farms.

(*e*) Swimming pools.

(*f*) Sanitary surveys of dormitories, boarding houses, cafeterias, restaurants, ice cream parlors and class rooms.

(g) Surveys of the work of local organization in the fields of medical social work, hospital dispensary, child welfare, industrial hygiene, school child's health, official local health department and voluntary local health organizations.

4. Desirable for demonstration and research. Projectoscope (may be used in conjunction with other departments), calorimeter, immersion and refractometer, devices for testing personal efficiency, potentiometer, punch card and tabulation machine.

PHYSIOLOGY

General Equipment: 1. Laboratories, dark room, etc. (See Laboratories.)

2. A ready supply of animals and facilities for housing, feeding and care of same.

3. Mechanics' work shop and equipment for same, including glass work.

4. Sterilizer and instruments necessary for aseptic surgery.

5. Laboratory equipment including icebox, centrifuge, thermostats, still, balances—common and analytical—calorimeter, cryoscope, polariscope, galvanometer, apparatus for PH values, apparatus for collection and analysis of gases, stands, clamps, water baths, rubber tubing and stoppers, ample supply of glassware, chemicals, drugs and other general laboratory supplies.

6. Projection apparatus (may be used in conjunction with other departments).

7. Special apparatus for demonstration and research cannot be listed.

8. Student Equipment: (*a*) For group of two students: Kymograph, inductorium, electric keys, electric cell, platinum and nonpolarizable electrodes, femur clamps, double clamps, iron stands, muscle and heart levers, magnetic signals, tuning fork, frog boards, moist chamber, rheocord, commutator, muscle warmer, thermometer, assorted tambours—both recording and receiving, etc.

(*b*) For group of not more than six—can be used in rotation: Long kymograph, mammalian animal holders, mechanism for maintaining artificial respiration, tracheal and arterial cannulas, graduated syringes, mercury manometer, spirometer, cardigraph, sphygmograph, sphygmomanometer, plethsmograph, chonograph, hemacytometer, bemoglobinometer, ergograph, artificial eye, color skeins, lenses, prisms, ophthalmoscope, perimeter, æsthesiometer, spectroscope, etc.

PHARMACOLOGY

1. Laboratories fitted for pharmaceutic and pharmacologic work. (See Laboratories.)

2. Museum collection of crude drugs and standard pharmaceutic preparations.

3. General equipment as for physiology.

4. Equipment in general for students in groups of two or more as listed under physiology 8, and in addition chemical glassware, such as funnels, evaporating dishes, beakers, flasks, graduates, burets, pipets, percolators, mortar and pestle, balances, etc., as are needed in preparing pharmaceutic preparations.

BIOCHEMISTRY

1. Laboratories, etc., for chemical work (see Laboratories).

2. General equipment as for physiology and in addition Kjeldahl apparatus and accessories, gas generators, colorimeter, drying ovens, dessicators, Soxhlet extraction apparatus, hydrometer, glassware for quantitative determinations.

3. Special apparatus for demonstration and research.

4. Equipment for each student: Chemicals and reagent bottles, graduates, beakers, Erlenmyer and other flasks, volumetric flasks, wash bottle, funnels, crucible, mortar and pestle, pipets, burets, test tubes, test tube rack, evaporating dishes, urinometer, Bunsen burner, iron rings, tripods, crucible tongs, clay triangles, thermometer, filter paper, etc.

MINUTES OF THE THIRTY-FIRST ANNUAL MEETING OF THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES

The representatives of the colleges in membership in the Association assembled in the Florentine Room of the Congress Hotel, Chicago, March 7, 1922, and were called to order by the president, Dr. Theodore Hough, at 2:30 p. m.

ROLL CALL

The roll call showed that sixty-two of the sixty-six colleges in membership were represented, as follows:

Stanford University School of Medicine.—Ray Lyman Wilbur.
University of California Medical School.—L. S. Schmitt.
University of Colorado School of Medicine.—Charles N. Meader.
Georgetown University School of Medicine.—Geo. M. Kober.
George Washington University Medical School.—Wm. C. Borden.
Howard University School of Medicine.—Edward A. Balloch.
Army Medical School.—M. W. Ireland.
Navy Medical School.—Edward R. Stitt.
Emory University School of Medicine.—W. S. Elkin.
Loyola University School of Medicine.—P. J. Mahan.
Northwestern University Medical School.—Arthur I. Kendall.
Rush Medical College.—John M. Dodson.
University of Illinois College of Medicine.—A. C. Eycleshymer.
Indiana University School of Medicine.—Charles P. Emerson.
State University of Iowa College of Medicine.—John T. McClintock.
University of Kansas School of Medicine.—Geo. E. Coghill.
University of Louisville Medical Department.—Henry E. Tuley.
Tulane University of Louisiana School of Medicine.—W. E. Garry.
Johns Hopkins University Medical Department.—G. Canby Robinson.
University of Maryland School of Medicine and College of Physicians and Surgeons.—J. M. H. Rowland.
Medical School of Harvard University.—David L. Edsall.
Tufts College Medical School.—Frank E. Haskins.
Detroit College of Medicine and Surgery.—W. H. MacCracken.
University of Michigan Medical School.—Hugh Cabot.
University of Minnesota Medical School.—E. P. Lyons.
University of Mississippi School of Medicine.—W. S. Leathers.
St. Louis University School of Medicine.—H. W. Loeb.
University of Missouri School of Medicine.—Guy L. Noyes.
Washington University Medical School.—Nathaniel Allison.
John A. Creighton Medical College.—H. von W. Schulte.
University of Nebraska College of Medicine.—Irving S. Cutter.
Columbia University College of Physicians and Surgeons.—Wm. Darrach.
Cornell University Medical College, Ithaca and New York.—Walter T. Niles.
Long Island College Hospital.—Adam M. Miller.
Syracuse University College of Medicine.—Frank P. Knowlton.
University and Bellevue Hospital Medical College.—Samuel A. Brown.
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.—Wm. Louis Poteat.
University of North Dakota School of Medicine.—H. E. French.
Ohio State University College of Medicine.—E. F. McCampbell.
University of Cincinnati College of Medicine.—Henry Page.
Western Reserve University School of Medicine.—C. A. Hamann.
University of Oklahoma School of Medicine.—Leroy Long.
Hahnemann Medical College and Hospital.—G. W. Pearson.
Jefferson Medical College of Philadelphia.—Ross V. Patterson.
University of Pennsylvania School of Medicine.—A. C. Abbott.
University of Pittsburgh School of Medicine.—R. R. Huggins.
Woman's Medical College of Pennsylvania.—Martha Tracy.
Medical College of the State of South Carolina.—W. F. R. Phillips.
University of South Dakota College of Medicine.—C. P. Lommen.
University of Tennessee College of Medicine.—O. W. Hyman.
Vanderbilt University Medical Department.—L. E. Burch.
Baylor University College of Medicine.—McIvor Woody.
University of Texas Department of Medicine.—Wm. Keiller.
University of Vermont College of Medicine.—H. C. Tinkham.
Medical College of Virginia.—E. C. L. Miller.
University of Virginia Department of Medicine.—Theodore Hough.
West Virginia University School of Medicine.—J. N. Simpson.
Marquette University School of Medicine.—C. B. Moulinier.
University of Wisconsin Medical School.—C. R. Bardeen.
Meharry Medical College.—J. J. Mullowney.

MINUTES OF 1921 MEETING

The minutes of the meeting of 1921 being next in order for consideration, the secretary offered the minutes as published in the transactions of 1921 (page 79) in lieu of reading them.

On motion the minutes were adopted as printed.

REPORT OF SECRETARY-TREASURER

The secretary, Doctor Zapffe, then read his report.

A resolution adopted at the last meeting called for holding the annual meetings of the Association at some other time and place, at least in alternate years, than the meetings of the Congress on Medical Education and Licensure. To secure the opinion of the individual representatives who attend these meetings, a questionnaire was sent to each college in membership. The vote was to hold the meetings in Chicago either before or after the Congress. Other cities and times of meeting were mentioned, but on the whole the vote favored the separate meeting.

The matter was then referred to the Executive Council for action and the vote was five to two for meeting with the Congress this year.

The program for the meeting has been in your hands for some time. The arrangement is far better than ever before. Papers on the same or allied subjects are grouped, irrespective of their source, so that the discussion should be far more profitable and need not be repeated—as has been the case in previous years.

When the call for the meeting was issued, suggestions for subjects to be discussed were asked for to aid in making up the program. It was astonishing how many deans chose the subject of revision of the curriculum—making it less rigid, or more elastic. The consensus of opinion was overwhelmingly in favor of making a change which would improve the existing state of affairs. It is hoped that the report of the committee on

medical education and pedagogics which deals entirely with the curriculum will meet with the approval of those who were kind enough to express an opinion in the matter. All these letters were referred to the committee for what they were worth.

The following papers listed in the program were contributed as the Association's share:

1. A New Curriculum: Report of Committee on Education and Pedagogics, Dr. Hugh Cabot, chairman, dean University of Michigan Medical School.
2. The Student Internship: An Experiment in Medical Education: Dr. E. P. Lyon, Dean, University of Minnesota Medical School.
3. Address, Theodore Hough, M.D., President of the Association of American Medical Colleges.
4. Professors and Clinical Professors of Clinical Subjects, C. P. Emerson, M.D., Dean, Indiana University School of Medicine.
5. Teaching Facilities: Report of Committee on Equipment, John T. McClintock, M.D., Associate Dean, State University of Iowa College of Medicine.
6. The Cost of Medical Education to the Student, Irving S. Cutter, Dean, University of Nebraska College of Medicine.
7. Liberalization in Medical Education, A. C. Eycleshymer, M.D., Dean, University of Illinois College of Medicine.

The Committee on Equipment—which should be designated the committee on teaching facilities—was also confronted with quite a problem. Realizing the difficulties of the task set the committee, it was decided to report only on the teaching facilities needed for the courses in the first two years, of the so-called science years, of the curriculum. It is realized that it is wholly impossible to prescribe a fixed equipment standard, but many teachers have asked for guidance in the matter of equipping their departments, hence such a report cannot fail to be of value as an aid.

The transactions were distributed as in the preceding year—and a number of copies were sent to the deans of the South American medical colleges in response to a request received from one of their number. One thousand copies were distributed. The dean of each school in membership in the Association received a sufficient number of copies for distribution among the faculty—at least the heads of departments and divisions.

Boston University School of Medicine has asked for action on its application. Dr. Pepper was assigned to make the inspection and his report is in the hands of the Executive Council.

Albany Medical College has applied for membership but the time for inspection was too short to allow of taking action at this time. The Executive Council has the matter before it and will report on it later.

West Virginia University Department of Medicine was reinspected in accordance with the instructions of the Executive Council and this Association. The improvements made were noteworthy. The school is in excellent condition and the officers are deserving of great credit for the work done. A report is in the hands of the Executive Council.

It was not possible to make a reinspection of Baylor University School of Medicine. It was learned that improvements were being made in the school as well as in one of the allied hospitals; therefore, a reinspection at this time was not considered advisable. Action on the recommendation of the Executive Council made last year must be postponed in the absence of a report on the school. (Signed) FRED. C. ZAPFFE.

On motion, the report was received and ordered published. The financial statement was referred to an auditing committee consisting of Drs. W. F. R. Phillips, G. Canby Robinson and L. S. Schmitt.

The report of the Executive Council was read by its chairman, Doctor Cutter:

REPORT OF EXECUTIVE COUNCIL

Since the last annual meeting the chairman of the Executive Council endeavored to fulfill the duties of his office to the best of his ability, rendering his decisions with deliberation and mindful of the rights of all parties concerned. All his official acts have been duly approved by the Council in executive session.

The Council begs leave to report to the Association on such matters as properly must come before it for action:

1. *Wake Forest College School of Medicine*—Pursuant to instructions from this Association, a member of the Executive Council, Dr. Hough, visited this institution to determine whether the suggestions made by the Association last year had been acted on. Dr. Hough's report indicates that very great progress has been made and he strongly urged restoration to membership. The Council, however, is of the opinion that greater good can be accomplished by withholding full recognition; that the college authorities are anxious to do even more than has been done so far to bring the school to the highest plane for schools of its kind, and until these efforts have borne fruit—it is better to act slowly. Therefore the Council recommends that this school be restored to full membership for the period of one year, and that if the advances made during the past year are continued during the coming year, full membership be made permanent.

2. *West Virginia University School of Medicine.*—Two years ago this school was suspended from membership on the basis of the report of our inspector. Correspondence received from the president and the dean of the school indicated that all points raised had been met and therefore the school should be reinstated to membership. A re-inspection was ordered and the Executive Council was given power to reinstate the school if its claims were found to be correct. The secretary made a second inspection and found the school in excellent condition—with an enlarged faculty, an adequate budget, and more room with increased teaching facilities. Therefore, the Executive Council recommends that this institution be restored to full membership.

3. *Baylor University School of Medicine.*—Last year this institution was found deficient in many respects, but pending certain improvements which were projected and would soon be under way, no action was taken except to continue the school in membership for one year.

Reports coming indirectly to the attention of the Council indicate that material changes are in progress—but in the absence of a re-inspection no action can be taken at this time. The school has at all times expressed a willingness to be guided and assisted, therefore, the Council does not wish it to be understood that the school is "under fire," but rather that it is doing its utmost to overcome certain difficulties largely of an administrative nature rather than a serious pedagogic deficiency. It remains merely to confirm reports of progress by a re-inspection which will be made soon after the opening of the fall session.

4. *Boston University School of Medicine.*—A second inspection by Dr. Pepper has shown such commendable improvement in all phases of the institution's activities that the Council strongly recommends that the College be admitted to full membership.

5. *Albany Medical College.*—An application for membership was received from this institution two weeks ago—too late to make an inspection to be acted on at this meeting.

The Council recommends that it be empowered to admit the College to membership if on inspection it is found to comply with all rules and regulations on which medical schools are now adjudged. Reports from reliable sources indicate that the College is reputable—that it is sufficiently endowed and equipped financially and materially to qualify for membership in this Association, hence an inspection will need only to confirm—and, perhaps, be of assistance to the College in some ways—administratively or pedagogically.

(Signed) IRVING S. CUTTER, *Chairman.*
C. R. BARDEEN
G. CANBY ROBINSON
THEODORE HOUGH
FRED. C. ZAPFFE.

Doctor Lyon moved the adoption of the report and the recommendations contained therein. Seconded.

Doctor Phillips moved that in the recommendation bearing on the Wake Forest College School of Medicine the clause "for one year" be not concurred in. Seconded.

The motion failed to pass.

Doctor Lyon's motion was then voted on and passed.

REPORT OF COMMITTEE ON EDUCATION AND PEDAGOGICS

Dr. Hugh Cabot, the chairman of this committee, stated that the report of the committee had been read at one of the sessions of the Congress, and, therefore, he did not read it again but presented it as read for action. *(p. 73.)*

Doctor Schmitt moved that the report be received and that copies of it be submitted to the colleges in membership for further consideration, with the understanding that action on the report will be taken in 1923, at the next annual meeting, when it will be regarded as a proposed amendment to the By-laws. The motion was seconded by Doctor Lyon and duly passed, after Doctor Schmitt had accepted an amendment of his motion made by Doctor Kober to the effect that copies of the report be sent also to the Federation of State Medical Licensing Boards, and the National Board of Examiners with the request to aid this Association in its work.

REPORT OF COMMITTEE ON EQUIPMENT

Doctor John T. McClintock, the chairman of this committee, presented the report read at an earlier session of the Congress for action at this time. *(p. 92.)*

Doctor Bardeen moved that the report be received and printed in the transactions, and that further action be deferred until the report is completed by including consideration of the equipment of the clinical years. Seconded by Doctor Cutter, and passed.

REPORT OF SPECIAL COMMITTEE ON TEACHING HYGIENE

Doctor Alexander C. Abbott, secretary of this committee, stated that the report of this committee is embodied in the report on the curriculum and that no further or additional report will be made.

This statement was accepted in lieu of a report, and the committee was discharged.

At this juncture the president appointed the nominating committee: Doctors Noyes, Meader and Myers.

The president then read a letter from the dean of the Detroit College of Medicine and Surgery asking that three deans visit the college for the purpose of giving suggestions which might be of value in the reconstruction now going on. On motion of Doctor Schmitt, seconded by Doctor McClintock, the letter was referred to the Executive Council for disposition.

Report of Nominating Committee

Doctor Noyes, chairman of the Nominating Committee, presented the following report:

President: Chas. P. Emerson, Indianapolis.

Vice President: Irving S. Cutter, Omaha.

Secretary-Treasurer: Fred C. Zapffe, Chicago.

Executive Council: For two years, John T. McClintock, Iowa City; David L. Edsall, Boston.

On motion, the report of the committee was accepted and the secretary instructed to cast one ballot for the Association for the election of the nominees. The secretary did so, and the chairman declared the nominees duly elected to the offices mentioned in the report.

Report of Auditing Committee

Doctor Phillips reported that the Auditing Committee had found the treasurer's account correct.

On motion, duly seconded, the report was accepted.

Place of Next Annual Meeting

Doctor Phillips moved to consider Article VII, Section 1, which has been violated in past years. (This section refers to the time and place of holding the annual meetings). No second.

Doctor Borden moved that the next annual meeting be held in Chicago. Doctor Lyon offered as an amendment to this motion that the next annual meeting be held in Ann Arbor, Michigan. This amendment was seconded by a number of the representatives and was accepted by Doctor Borden, who made the original motion. The motion as amended was carried unanimously.

There being no further business to come before the Association at this time, a motion to adjourn subject to call by the Executive Council prevailed.

Adjourned.

(Signed) Theodore Hough, *President.*
Fred. C. Zapffe, *Secretary.*

MINUTES OF THE ORGANIZATION MEETING OF THE EXECUTIVE COUNCIL

At the meeting of the Executive Council held in the Congress Hotel, Chicago, March 7, 1922, the following business was transacted.

The meeting was called to order by the secretary.

On motion, duly seconded and carried, Dr. John T. McClintock was elected chairman of the Council for the ensuing year.

On motion, duly seconded and carried, Dr. Zapffe was appointed the delegate for the Association to the Council on Medical Education of the American Medical Association.

On motion, duly seconded and carried, an honorarium of $1,000 was voted to the secretary-treasurer for the ensuing year, and an honorarium of $200 to the chairman of the Council.

On motion, duly seconded and carried, the following membership of the three standing committees of the Association was appointed:

Committee on Education and Pedagogics: Hugh Cabot, chairman, University of Michigan; Ray Lyman Wilbur, Stanford University; Walter L. Niles, Cornell University; Alexander S. Begg, Harvard Medical School; E. P. Lyon, University of Minnesota.

Committee on Equipment: William Pepper, University of Pennsylvania, chairman; Thomas S. Cullen, Johns Hopkins University; G. Canby Robinson, University of Nashville.

Committee on Medical Research: L. S. Schmitt, chairman, University of California; Nathaniel Allison, Washington University; W. B. Cannon, Harvard University.

The Council then adjourned.

JOHN T. MCCLINTOCK, Chairman.
FRED. C. ZAPFFE, Secretary.

OFFICERS AND COMMITTEES FOR 1922-1923

President: Dr. Charles P. Emerson, Indianapolis.
Vice President: Dr. Irving S. Cutter, Omaha.
Secretary-Treasurer: Dr. Fred. C. Zapffe, 3431 Lexington Street, Chicago.

EXECUTIVE COUNCIL

Dr. John T. McClintock, Chairman, Iowa City, Iowa.
Dr. J. Ewing, New York.
Dr. G. Canby Robinson, ~~Nashville.~~ [Vanderbilt]*
Dr. David L. Edsall, Boston.
Dr. Theodore Hough, Charlottesville, Va.
Dr. Charles P. Emerson, Indianapolis.
Dr. Fred. C. Zapffe, Chicago.

COMMITTEES

Committee on Education and Pedagogics

Hugh Cabot, Chairman, University of Michigan.
Ray Lyman Wilbur, Stanford University.
Walter L. Niles, Cornell University.
Alexander S. Begg, Boston University.
E. P. Lyons, University of Minnesota.

Committee on Equipment

William Pepper, Chairman, University of Pennsylvania.
Thomas S. Cullen, Johns Hopkins University.
G. Canby Robinson, University of Nashville.

Committee on Medical Research

L. S. Schmitt, Chairman, University of California.
Nathaniel Allison, Washington University.
W. B. Cannon, Harvard University.

MEMBERS

[ALABAMA]
[U. of Ala. School of Med.]*

CALIFORNIA

Stanford University School of Medicine, San Francisco.
University of California Medical School, San Francisco.

COLORADO

University of Colorado School of Medicine, Boulder and 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.

[*Printer's error — See p. 163 of 1923 Proceedings]

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.
Rush Medical College (University of Chicago), 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, Lincoln and Omaha.

NEW YORK

Columbia University College of Physicians and Surgeons, New York.
Cornell University Medical College, Ithaca and New York.
Long Island College Hospital, Brooklyn.
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.

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

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.

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.
University of Wisconsin Medical School, Madison.

AFFILIATED MEMBER

Meharry Medical College, Nashville, Tenn.

ASSOCIATE MEMBERS

Dr. James R. Guthrie, Dubuque, Iowa.
Dr. William P. Harlow, Boulder, Colo.
Dr. George H. Hoxie, Kansas City, Mo.
Dr. William J. Means, Columbus, Ohio.
Dr. W. F. R. Phillips, Charleston, S. C.
Dr. Henry B. Ward, Urbana, Ill.
Dr. Fred. C. Zapffe, Chicago.

HONORARY MEMBERS

Dr. Henry S. Pritchett, New York.
Dr. Kendric C. Babcock, Urbana, Ill.