test it fully. I must say that I am actually shocked at the kind of English that some of our medical students, even those who have an A.B. degree, are capable of using. Something must be done to better conditions. I am sure that all of you who are teachers must have observed the lack of thorough mental training that is so manifest. We must ferret out the causes of the deficiency and correct them. Personally, I am always glad when a man can have four years of college work before entering medical school. I do not say that the time has come when we should require that of every medical student, but I am glad when a man can have the full college course before entering medicine, and if my boy wanted to go to a medical school I should advise him to take the four years in college before entering upon medical studies. If I had to, I should try to borrow the money, even, in order that he should not be deprived of the great advantages that the college course would give him.

Dr. Roberts and Dr. Dock emphasized what it means to the physician to have the background of a liberal education. Merely technical education is insufficient for the highest work in medicine. The man as developed by general education behind the technical education counts fully as much as the technical education itself. The personality of a man who has wide interests, who knows about the world, and who has traveled in it, can go far toward helping men and women who are sick. To attain success in dealing with cultured and educated patients, the physician needs the kind of personality that will bring conviction, that will inspire confidence, and that will insure sympathy. That can only be developed fully, even with great natural endowment, through an extensive liberal education. Then, aside from that, aside from the fact that we have our patients to think of, I think the personal pleasures that come to the physician from such an education are not to be despised. As we pass middle life, especially, and through organization are able to throw some of the details of our work upon younger shoulders, there is great refreshment to be obtained by going back to some of the subjects we studied in our college days. I know a distinguished neurologist in New York whose hobby is translating Latin and Greek into English. He thinks this pastime much more fascinating than chess. As practitioners we have to make a living, but we also need to make that living as worth while as possible to ourselves and others after we have earned it.

I believe that many students could graduate with four years of college work at the time they finish the second year of college now. For they could be very much better taught than they are now. The chief improvement is, I think, to be made in the high schools, or preparatory schools; though, to a certain extent, time could be saved in the colleges themselves.

THE SENIOR STUDENT*

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In the issue of the *Journal of the American Medical Association* of February 3, 1917, there appeared an article entitled, "Teaching Internal Medicine: Each Student a Teacher." Briefly the plan was a round table idea for didactic teaching. Each student was given a subject which he studied, handed in as a medical paper, presented the subject orally to the class, and remained the authority on that subject for the year in the class. The sum total of these subjects constituted the outline for the course and the papers with their discussions the course itself. By this method responsibility was thrown upon the student; his ability to think, write, and express himself developed with the gain of his voluntary interest and enthusiasm.

This system has been extended to the clinical work with the idea of increasing the responsibility of the student, to the end that he might be teacher as well as learner, in order that his powers of observation, expression, reason, diagnosis, and judgment might be more surely developed. In Emory University the senior clinical work in the Department of Medicine consists of: (1) clinical clerk service, 10 to 12 daily; (2) ward teaching, 2 to 4 daily; (3) medical clinic, one hour, twice weekly. In the clinical clerk service the work consists of history-taking, physical and laboratory examinations. In the ward work a distinction is made between ward rounds, which are primarily for the benefit of the patient; and ward teaching, which is primarily for the benefit of the student. An intensive study is made of one or two diseases each period rather than a few minutes given to each of many patients. We have so many diseases in our clinical repertoire, and each new disease that the student learns is but

*Read in Conference on Medical Education, Southern Medical Association, Eleventh Annual Meeting, Memphis, Tenn., Nov. 12-15, 1917.

an addition to his repertoire. It is well for the student to understand the full sweep of the noun "disease," and the phrase "clinical entity." In this way each new disease is a great new thing, a new whole, slightly variable, and perhaps composite, but as scientifically definite as Sydenham said it was. It is for the student to recognize, grasp, and remember the *simile in multis* of each disease.

A patient is reclining on pillows. The section is standing around the bed. Each student is asked what he sees in the patient, and he must note something not previously mentioned by any other man in the section. Each man misses something in every case. This is an interesting fact. Does a physician miss something in every case? Two men examine the heart and two the lungs; or two the chest and two the abdomen. The rivalry of pair work is good, and then it affords opportunity for discussion and the students draw each other out in evidence and proof. In ten minutes the heart men report their findings. They differ. The two other students examine the heart. Finally the errors of omission and commission are discussed, correct diagnosis approved, and a conclusion reached. A doubting Thomas is nearly always present in each section; he asks questions, and acts as a Socratic irritant as well as stimulant. The students answer his questions, if possible; if not, the teacher is appealed to. The case was one of aortic regurgitation with a relative mitral regurgitation. The capillary pulse, the throbbing vessels, the pressure, the Corrigan pulse came in for their attention. To one student was assigned to present at the next ward period a paper on "The Corrigan Pulse with Remarks on Corrigan."

The two men on the lungs reported next; passive congestion, the lungs and heart disease, rales—always easy for the professor, never for the student. Questions and answers come faster now. The section is veritably on its intellectual toes; it is learning with interest and enthusiasm. One hour gone and neither teacher, student, nor patient exhausted. A student makes a summary of the patient's pathology. The teacher never does anything that he can get the student to do. Another disease has been added to the clinical repertoire of the student. Cases of the same disease are compared. This accents the variations of the same disease in different patients. At another time every tongue in the ward is examined, and it is rare to find any two alike. At another period every radial and temporal artery is palpated; at another, the blood pressure is taken on every patient. Clinical comparisons are not odious, but are striking and impressive.

At the next meeting, the paper on the Corrigan pulse is read and discussed, or summarized. A very profitable method is to pass the paper prepared by one student to another for reading and written comment. It is then passed on until in a week all the men in a section read it, and add the written comment to it. If a paper is well done and important, it may be summarized before the whole class at the medical clinic. New questions are continually arising, for medicine is as broad and restless as the ocean. Questions and comments foreign to the teaching purpose are kindly turned to silence. Many things can not be answered. Absolute honesty is fundamental. Accuracy, thoroughness, and honesty are the triple graces of medicine. A condition in a patient either is or is not. There is no always or never in medicine. Each student must give his opinion so clearly that the others are satisfied as to his meaning. He must distinguish between essentials and non-essentials. His opinion is one thing, but the diagnosis may be quite another thing. Opinion and diagnosis must coincide. However, the opinion of the student is respected and he is taught to respect his own judgment, not to worship it. The student understands that his teacher always silently says, "I like to hear you say what you think," as Socrates told the boy in Meno. In this spirit the work proceeds. It really ceases to be work; it is life and pleasure.

At the medical clinic the section really holds the clinic. To each is assigned a duty in presenting the patient, and each member of the class has the right to ask the student in charge any question he desires. Appeals often come thick and fast. Confessions of past misconceptions are

frequent. Symptoms and signs, diagnosis, final impression, judgment and treatment come in for their small attention. The hour is all too short, and the diseases are many. A new disease every hour on the hour is the stimulus for interest and action. These are but a few of the many variations, and the interest increases as the year passes.

The Jew Jesus and the Greek Socrates are the greatest teachers in personality, spirit, and the virtue of their pedagogy that the world has seen. Separating for the moment the one from his religion and the other from his philosophy, illustrations from their methods will more easily permit analysis and summary, and aid us in pioneering into the pedagogy of medicine.

He was alone, only His disciples were with Him, and generally in a low tone he asked, "Whom say the people that I am?" They answered rather quickly, little knowing what the teacher was leading to, "Some say John the Baptist, some Elias, some a prophet." The bad things were not told, if there were any. Again quietly, the first question was but a feeler, "Whom say ye that I am?" The first question involved memory and the answer was but a quotation; the second observation, reason, the confession of a personal impression. He passed from the said to the unsaid, from the known to the unknown, and led them on,—all clear-cut and simple. The students did most of the talking, and for them, much thinking.

It is the "Republic" of Plato, that student who esteemed it a gust of fortune to have been born in the life-time of Socrates, his teacher. Socrates, with many Greeks and no barbarians, is seated in the home of Polymarchus, whose aged father Cephalus with garlanded head sits on a cushioned chair. Cephalus and Socrates are old friends. Socrates begins on the pleasure of conversing with old men, "and this is a question which I should like to ask of you who have arrived at that time which the poets call 'the threshold of old age'—Is life harder toward the end, or what reports do you give of it?" For a page the old man answers with much of wisdom and little of the vocal creaking of the aged. He talks out. He probably has both emphysema and arteriosclerosis. And then in one brief paragraph is summed the Socrates method and the kindly sympathy of true pedagogy in whatever branch of human learning it is applied. Socrates goes on, "I listened in admiration and *wanting to draw him out that he might go on.* Yes, Cephalus, I said; but I rather suspect that people in general are not convinced by you when you speak thus; they think that old age sits lightly upon you, not because of your happy disposition, but because you are rich, and wealth is known to be a great comforter."

What is the explanation, the insinuating intuition of all this? We know that teaching is three-fold—who teaches, what is taught, how taught. Perhaps this is the analysis:

1. These teachers led their students from the known to the unknown, from objective to subjective, from practical to theoretical, from facts of memory and observation to principles and processes of reason.

2. They threw on the student the burden of thinking, deciding, and acting.

3. Conversation was free, the open mind was the rule, and there was a common fellowship of effort.

4. Every method looked toward the cultivation of reason rather than memory, judgment rather than imitation. To this end questions were answered by another question, or asked and not answered, or a principle uttered simply and like a dart, or the whole matter left open.

5. There was unconsciously impressed upon the student the personality, force, and character of the teacher. They were men of experience in life and they brought that experience richly to the teaching circle.

Year by year the students are improving when they reach the clinical years. The fundamental branches are better taught by better trained men. Are those of us who are clinical teachers improving as teachers? Are we keeping pace with progress in medical education? Are we repeating our old lectures year by year, or are we striking out boldly with increasing force of impression from the increasing stores of our experience and knowl-

edge? Our senior students are the processes and functions of the medical future, and they are

" * * * searching hungrily
Each human being for the stuff of life,
The sharp blue flame beneath the smoke,
The authentic cry."

The day of the clinical orator is past. The clinical orators are not all dead, but their functions as teachers of modern medicine are nearly useless. The masterful medical man will forever address bodies of his fellow physicians on medical subjects in which he has specialized beyond the common run, but the senior student gathers in little groups, in small classes, and learns in conversational tones the great facts and principles of clinical medicine. The patient after all is the master teacher. Which is greater in the kingdom of Heaven, and the answer was a spiritual clinic, and a little child was the patient. In our clinics, the patient with his complaint, his symptoms and signs and pathology, constitutes the great source of our learning. He will always be scientifically infectious to medical men.

By fate or an unfortunate conjunction of circumstances I have never seen this man Osler. I have studied his methods from his students. He looked at a patient with a distended abdomen. What four things cause it? The four Fs—fat, fetus, fluid, flatulence. The question raised, the answer in part, but impressed forever and all so simple. He was transforming the senior student into the mature student. The students say there are but few teachers. They may be born rarely; I do not know. How many in my student days, how many in yours?

We teach many things. How many do we impress? Garrison studying pellagra accumulated thousands of facts. Which of them mean anything. He exclaimed, "God bless the man who knows a fact when he sees it." Do our students recognize the great facts as we develop them? Laboratory, radiograph, instruments of precision, tests, and signs; and are our students improving in clinical judgment? All these lesser things are but means to the larger end. Articles and books come in ceaseless succession, bewildering even to the veterans. How many leave us wiser, how many clear our scientific vision? And yet we would starve medically without them.

The pedagogy of medicine is new ground. It needs clearing and ploughing and planting to the end that the race of men may be even better served by the higher training of those who call themselves "physicians." And though I have the gift of diagnosis, and understand all symptoms and all physical signs, and though I have all apparatus so that I could remove all doubt, and have not clinical judgment,—I am nothing.

DISCUSSION

Dr. Lewellys F. Barker, Baltimore, Md.—Personally, I am quite in accord with Dr. Roberts when he says it is desirable to make the student do everything that is possible by himself. That is one of the teacher's functions, to make the student teach, for by teaching the student learns. I was especially glad to hear the part of Dr. Roberts' paper in which he spoke of "clinical judgment." We as teachers do not often pay enough attention to the development of the later stages of the diagnostic art. The student is taught how to take an anamnesis, how to make a physical examination, and how to make various laboratory tests, and it is very natural for him to think he can make a diagnosis. But these are only the data for defining more clearly and localizing more accurately the diagnostic problem. It is necessary to arrange and to co-ordinate the accumulated data to form hypotheses to explain them, to consider carefully the implications of each hypothesis formed, and to see in how far the hypothesis as developed by reasoning is supported or refuted by the data accumulated. Further observation or experiment may often be required in testing the hypothesis that seems to solve the diagnostic problem. I think that we as teachers do not often enough point out that the mere accumulation of data, of physical signs, of laboratory tests, of x-ray findings, of specialists' reports and so on, are only the early steps toward diagnosis. Many patients present a series of pathological processes rather than a single one, and the diagnostician has to decide, first, what the several abnormal processes are that are going on in the body; and, secondly, what the relative importance of these several processes is. Besides this study of the pathological physiology in the patient, an attempt should be made to define the anatomical basis of the disturbances; and, finally, if possible, to determine the etiology and the pathogenesis. Until all this has been done, and the results recorded, a complete diagnosis has not been made. It is our duty to make a "certainty diagnosis" where we can, and to follow that up with a "probability diagnosis" where we must. Sometimes we can not go further than the making of a "probability diagnosis." I think every physician will feel that this is true.

Dr. M. L. Graves, Galveston, Tex.—Dr. Roberts' plan of teaching the student, it seems to me, has a number of excellent ideas which, properly put into practice, would certainly be helpful to the student, but I must dissent from the idea that a physician can turn a clinic over to his class without direction of studies, clinical histories, or definite physical examinations. I do not even feel that the day of the clinical orator is past. I do not think the history of the world will ever develop a time when the orator, the real orator, the man who is capable of inspiring his class, is lost in any profession. I recognize that the time has past when a man can get up before a class and give it a lot of eloquent generalities. I think his day is past, and happily, but the time when a man can stand before his students and teach them some of the known facts of medical science in the clinic is not past, and in my judgment will never pass. The ward conferences that Dr. Roberts has made so useful in his own work will never do more than supplement the work of the master clinician.

Dr. George Dock, St. Louis, Mo.—I was very much impressed with Dr. Roberts' plan last year when in Atlanta. He showed me what he was doing and I could see for myself just how well this matter worked, and I know Dr. Roberts will understand, from his experience as a teacher, why I have not done exactly the same thing myself. The reason is that I have long been carrying out the Socratic method, but in a different way. I have always been interested in the things that the students do not read from textbooks and periodical literature, and I have always tried to get students to read, and during the last couple of years, and especially this year, I have had them reading particularly war literature. We do a great many of the things that Dr. Roberts spoke of in the class, except we do not ask the student to teach. He is an informal teacher all the time, but we have assigned all the important topics in war medicine to members of the clinical students, and they are expected to keep up with it week by week and be prepared to give an informal talk of about fifteen minutes, on short notice, at various times to the rest of the class. All these men are going into the Army and what they are reading about and hearing about of the conditions that they will be up against over there, they not only get the technical part of it, but they are getting a vital picture of life in military service from the medical point of view. I might recommend that method to those who have not yet tried it as a very good way of stimulating interest in periodical literature, and at the same time carrying out a lot of instruction that one can hardly cover in class hours.

Dr. Roberts (closing).—I probably did not make myself so clear as I should in my refernce to the "clinical orator." I made no reference whatever to my own part in holding these clinics. I have found this out, however, that it is one thing for a speaker of science and equipment to address a group of men who are already doctors, but it is quite another thing for that same finished speaker to address a class of fourth-year students; and sometimes the smoother the lecturer, the less benefit the student receives from the course. The man who just lectures to his students will not accomplish very much. I remember asking a graduate of one of our best schools what he got out of his senior work and he answered: "Well, I don't know." I asked him who he thought his best teachers were, and he mentioned two or three. In reference to the teaching methods of Dr. Osler, this same graduate said that he did not remember everything that Dr. Osler told him, but that he did remember everything that Dr. Osler told him *to look up*, and particularly those things that he *looked up* and *reported* to him. A clinic is something more than opportunity to give vent to one's opinions. In the clinical methods that I have outlined I often take time to outline briefly a point, to emphasize an important matter, and to assist the student to distinguish between the essentials and the non-essentials. If the student is on the wrong track, it is promptly shown him. And this method of throwing the burden upon the student seems to reach his understanding better and to leave him better off medically.