

Given to Marlene Jayne

by Dr. W. Darby

Shavings from an Old Bore(d)

by

Dr. C.S. Robinson

D.M.P.

C.S. Robinson was
second chair of Biochem.

There is an old adage which says "Fortunate are young men for they shall see great things." During sixty-odd years as a student, teacher and investigator in the field of biochemistry, half of which was spent in the early years of the development of the Vanderbilt University Medical School, I have seen great things.

The Vanderbilt University Medical School was founded over a hundred years ago. Although, as the name implies, it was part of the University, the connection was a tenuous one. It had its own campus remote from the University campus, its own buildings and its own faculty. The main building is still in use, housing the Children's Museum.

The publication in 1910 of the Flexner Report caused an upheaval in medical education in the United States with the abolition of many so-called medical schools which were that in name only, and the upgrading of standards and equipment of those schools which survived. As a part of this revolution the Rockefeller Foundation, General Education Board and other foundations conducted a survey of the facilities for medical education in the South and found in that area no adequate medical center. The foundations decided to establish such a center. After investigating the possible locations they chose to build it in Nashville.

Having made the decision they did two very courageous things. One of these was to abandon the campus and buildings of the old medical school and relocate it on the campus of the University. This was a costly and really unpopular procedure. Besides the administration and other buildings in use, the Medical School had a new hospital almost ready for occupancy. This was abandoned and for many years it stood vacant with its doors and windows boarded up. But the judgement of the Foundation dictated that if the new school was to be a part of the University it should be so physically as well as administratively.

The second courageous act was to place all the Medical School under one roof. To appreciate this innovation one must look at the structure of medical schools and curricula throughout the country as they then existed. For reasons to be discussed later, the medical curricula had been divided into two parts, the two so-called preclinical years and the last two clinical years. These two divisions were entirely separate and in most cases not only in the type of subjects taught but physically as well. Instruction in the first two years was frequently given at some distance from the hospital and centers of clinical instruction. At the University of Michigan preclinical teaching was done on the University Campus only about two miles from the hospital but in Kansas the preclinical courses were given in Lawrence which was forty miles from Kansas City where the hospital was located. In the new Vanderbilt school (and also in the new University of Rochester Medical School which was organized at the same

time) all departments of the Medical School were in one building with only an imaginary line separating the clinical and preclinical departments.

To understand the importance of this one must look at the evolution of medical education. When I graduated from high school I had two choices available for a college education. I could enroll in an academic school and after four years with reasonable industry and some luck could graduate with a Bachelor's degree. But I could also enroll in a medical school and after four years, with as much industry and a lot more luck, graduate with an M.D. degree.

Young folks in those days undertook the study of medicine for the same reasons they do today. Some had parents who were physicians; some saw prospects for an easy living; some wanted the prestige of a professional occupation; but most of them were interested in curing the sick. These students had visions of engaging in some aspect of this activity immediately on entering medical school. The discovery that this was only a vision and that the first two years in medical school were two years of almost pure academic work remote from any clinical practice made these years an ordeal to be endured and not enjoyed. This was a tragic disappointment that many did not survive.

Now in those days, although medical science had not assumed nearly the importance that it has today, one still had to know something about chemistry, physiology, bacteriology, etc. And high school science contributed little to this knowledge. Hence it was important that the first two years of medical school should be devoted to instruction in these basic sciences, leaving little opportunity for their application to medical problems.

My first job after graduation from college was teaching organic chemistry to medical students. This was not biochemistry but the same basic organic chemistry that was taught to chemistry majors. It had no obvious relation to medicine. Of course, it dealt with carbohydrates, fats and proteins but only on chemical compounds. Incidentally, for the first time we could tell the class what proteins were. Emil Fischer had just described the amino acid structure of protein.

Although physiology, bacteriology (the term microbiology was coined later), and especially anatomy were more closely related to medicine, their discussion in the medical curriculum was more academic than clinical.

Hence the innovation of a self-contained medical school operating as a four year unit was revolutionary and stimulating. This new image was not limited to the physical plant. With clinical facilities available the preclinical faculty drew on them to add interest to an otherwise unattractive program. They put a clinical frosting on the preclinical cake. Members of the clinical services lectured to the first year students on such things as diabetes, nephritis, and other diseases of biochemical interest; presenting patients to illustrate their talks. Examples of variations in blood sugar, serum proteins, etc., were taken from patients charts and not from imagination or text books. In brief, we sought to make the course a four year course

in medicine.

In a recent article on "Our Backward Medical Schools" in the May, 1966 Atlantic Monthly the author suggested this as a desirable innovation. We were doing it forty years ago.

When I first became interested in medical education at Michigan there was no such thing as "biochemistry" as we know it now. Medical students took a two hour course listed in the catalog as "Physiological Chemistry" but known to the students as "P.Chem." I took it. There was no "Department of Biochemistry". In fact there were no biochemists. "P. Chem" was given by the Professor of Bacteriology. I found that they were having trouble filling out their time. Much of what they taught I had already taught and, in the estimation of at least one individual, done it better. There were no quantitative methods to compare with the ones in use today. Fehlings qualitative test for urine sugar may have been made roughly quantitative and there was a rough quantitative method for urea in urine. The field of blood chemistry had not been entered at all. A colorimetric method for hemoglobin was probably no more accurate than the one which practitioners had used for years. It consisted of putting a drop of patient's blood on a pillow slip beside a drop of the doctor's blood and estimating the degree of anemia from comparison of the color. Terms like acid-base balance, acidosis and alkalosis were unknown.

But during the next decade this was completely changed. Just ten years after I took "P. Chem" I was giving a course called "Quantitative Clinical Chemistry" to laboratory technicians in the armed services in which we spent several weeks teaching methods for the analysis of blood, urine, and other body fluids that were as accurate as any chemical methods.

The leaders in this revolution were Benedict Folin and Van Slyke. The greatest single advance was made by Van Slyke's invention of the so-called "gas machine". This was a simple piece of apparatus which enabled one to measure the bicarbonate content of blood by means of the volume of CO₂ released on acidification and the hemoglobin content by measuring the oxygen released. In this first apparatus the gas volume was measured at atmospheric pressure. The methods were accurate and easily performed. In fact many physicians used them as office procedures.

But this original apparatus was displaced by the so-called "Manometric machine" in which the gas was brought to a definite volume and the pressure measured. This apparatus was more complicated than the earlier one and the technique more difficult to perform. But whereas the simple apparatus was used routinely for only bicarbonate and oxygen the later model could be used for over twenty analytical procedures. I watched Van Slyke demonstrate it at a Federation meeting in Rochester. At the conclusion of the demonstration a member of the audience remarked "In a couple of weeks he will be able to do a complete autopsy with it."

One interesting and, in retrospect, amusing experience concerned the procurement of arterial blood for routine clinical use. Veins had been entered for various purposes and by various means for cen-

turies but arteries were sacro sanct. When the epidemic of respiratory diseases swept the country at the beginning of World War I the importance of the new knowledge of blood chemistry became impressive. At the Rockefeller Institute which had become a center for the study of such diseases, pressure was put on the hospital laboratory to devise a method for obtaining samples of arterial blood. Dr. William Stadie was the hospital resident and we spent several weeks on the problem most of the time picturing in our imagination the dire results that would follow the puncturing of an artery. In the commonly read literature there was only one report of an investigator getting a sample of arterial blood for experimental use. Professor Barcroff had secured such a sample by suctioning off his own radial artery. This of course destroyed the artery and was not a procedure that could be used on patients. But one morning while browsing through the library we found a report in an obscure German medical journal written in 1857 by one Dr. Meier who described a series of arterial punctures which resulted in no catastrophies. After lunch Dr. Stadie and I returned to the Hospital. He stopped at his office for a syringe and needle. With my arm on my desk he inserted the needle into my radial artery and the pressure in the artery filled the syringe with bright red blood. After that, arterial punctures became routine practice.

When the general policies for the new school had been formulated, work was begun on the construction of the building and simultaneously the organization of the faculty. The administrative faculty was to serve on a full time salary basis with a clinical faculty of part time members to assist in teaching.

Dr. G. Canby Robinson was named Dean and Professor of Medicine. With approximately two years before the school could open, he had ample time in which to make selections. As individuals were appointed they were sent abroad with their wives to study medical education in other countries.

The professional accomplishments of this original faculty as teachers, clinicians, and investigators reflects the wisdom of Dr. Robinson's appointments. But behind the obvious professional qualities of the group was an image less obvious but as important and perhaps unique. No school has ever had a faculty the members of which (together with their wives) were more congenial or more devoted to each other than was the original faculty of the Vanderbilt University School of Medicine. In all the years of my association with them I recall no instance of personal antagonism. This is not to say that there were no differences of opinion or heated debates. At times Executive Faculty meetings were full of sound and fury. But once the argument was over the decision was accepted with no resentment or recrimination.

One important factor contributing to this splendid esprit de corps was the scouting given to the faculty wives. As much attention was given to their personalities as to those of the faculty members. And this policy was followed in the choice of replacements of which I was the first.

When the Professorship of Biochemistry became vacant the Executive Faculty appointed a committee to recommend someone to fill it. After reducing the list of prospects to about half a dozen, Dr. Cunningham, the chairman of the committee, packed his bag and set out to visit those people in their local habitats. He came to see me in East Lansing and met my wife. She invited him to lunch. That was the end of his trip. That afternoon he returned to Nashville and recommended my appointment and that explains the mystery of how I became the second Professor of Biochemistry.

By the time the Vanderbilt Medical School was reorganized, biochemistry had become a recognized member of the chemistry family. The first Professor of Biochemistry was Dr. Glen Cullen. Dr. Cullen graduated from the University of Michigan with a bachelor's degree in Chemical Engineering. After a brief period in industry he was appointed to a position in Van Slyke's laboratory at the Rockefeller Institute. This proved to be most fortunate for both of them. The talents of each supplemented those of the other and the many papers that appeared under authorship of Van Slyke and Cullen report some of the most important advances in the field of biochemistry. Some of this was accepted for Dr. Cullen's doctoral theses.

Eventually he left the Institute to become the John Herr Musser Professor of Experimental Medicine at the University of Pennsylvania. From that post he came to Vanderbilt.

Dr. Cullen was one of those intense, dynamic individuals who was actively interested in everything with which he came into contact. Although his professional interest was in biochemistry, his membership in the faculty of a medical school stimulated a deep interest in the broad subject of medical education in all its aspects. He worked enthusiastically for the improvement and expansion of the school as a whole.

Probably his most important single achievement was his insistence that the faculty of the Medical School be allowed to accept graduate students whose work in the Medical School would receive credit in the Graduate School of the University. This not only benefitted the Medical School but it gave an added impetus to graduate work in the University which at that time was just beginning to assume importance. He was personally responsible for the introduction of graduate work in the medical sciences.

He also introduced the use of statistical methods to the School. It happened in this way. A candidate for a Ph.D. in one of the medical sciences had presented a thesis whose conclusions were not at all convincing. I happened to be visiting in Nashville when the candidate presented his thesis and was invited to be present. In the discussion by the committee following the candidate's ordeal, it was obvious that he was in trouble, but the final decision was postponed. I had been using statistical analysis in some work of my own and suggested to Dr. Cullen that they be applied in this instance. Dr. Cullen did this and showed that the results of the candidate's work were significant and he was granted his degree.

When Dr. Cullen came to Vanderbilt, interest in the application of physical chemistry to biochemical processes was at its peak. His mathematical training had given him easy access to this field and it was emphasized in the course he gave to the medical students. A slide rule was required equipment for all students. They were taught the use of logarithms, which many of them had never heard of. Great stress was laid on hydrogen ion concentration, buffers, acid-base balance, etc. the importance of which was just coming to be appreciated.

His many years of service in hospitals and medical schools had qualified him to be an expert in the application of biochemistry to medical problems and he was in constant demand by his clinical colleagues for such assistance. This created an unusual attitude on their part towards a preclinical subject.

After my appointment had been recommended, but before it was made, I was invited to spend several days in Nashville to look over the situation - had to be looked over. My visit happened to coincide with the annual picnic given by Dr. and Mrs. Burwell to the Medical Faculty at their home on Lynwood Boulevard. This was one of the delightful social events of the year to which everyone looked forward.

The next day I had a visit with Dr. Burwell in the course of which he remarked "Robbie, you know I consider the Professorship of Biochemistry as the most important post in the School because Medicine is just a branch of Biochemistry." This comment was not at all reassuring to a country boy already suffering from an inferiority complex. But I passed it off with the assumption that he was just trying to make me feel important. However, I had not been on the job two weeks before I realized that he meant exactly what he said. In the course of the next several months the two departments became so closely integrated that there was a question of what was a branch of what. I made staff rounds with the Department of Medicine. My staff worked with members of the Medical House staff. Members of that staff who wanted to work on biochemical projects were given space, equipment, and advice in my department. At times one saw more house staff than biochemists in my corridor. Our research projects were frequently carried out jointly with interns, or, for instance, the work on shock by Drs. Blalock and Mort Mason. The clinical laboratory was transferred from the Department of Medicine to the Department of Biochemistry, first under the direction of Dr. Mort Mason and later under Dr. Ann Minot. Instruction in biochemistry was carried beyond the first year. Dr. Minot held conferences with third year students on the clinical application of biochemistry. Dr. Burwell's remark could no longer be considered radical. Today when I hear house officers discussing a case they speak a biochemical language that I can't understand.

This is a far cry from "P. Chem!"

Dr. Cullen was a hard taskmaster who did not suffer fools gladly. But his obvious interest in giving his students the best possible training for future work, as well as some very human idiosyncrasies, endeared him to them all.

He was an enthusiastic but not too expert a golfer. His impetuous disposition frequently got him into trouble. I had been at

Vanderbilt for perhaps a year and was playing with a colleague who had been a frequent partner of Dr. Cullen's. One afternoon as we paused at a tee, he remarked:

"It sure is good to have regained my peace of mind. I've been worried for a long time."

"And what," I asked, "has been bothering you?"

"You," he said. "When I heard that Dr. Cullen had resigned and was leaving Nashville I knew we could never find an adequate replacement and I became very depressed. Dr. Cullen had the most fantastic vocabulary I've ever heard." "But," he added, "you're doing all right. You'll get by."

Dr. Cullen brought with him from Philadelphia Dr. Howard Robinson. He was a young man with a pleasant personality which made him a favorite with the students and he proved to be an excellent teacher. He had already won his spurs as an investigator and he continued to do creditable work here.

The third professional member of the staff was Dr. Johlin who had been teaching at Syracuse. He was the best trained chemist on the campus. He had a doctor's degree from Berlin under Emil Fischer and another from the University of London under Dorman.

Now of course Dr. Cullen was the Professor. He wore the purple, made the speeches and signed the requisitions. But Miss Margarete Womack, the secretary, ran the Department just as Mrs. Trabue and Juanita do today.

But the employee who solved most of the operative problems and gave glamor to the Department was the janitor, Ossie. He was a faculty child in the sense that his father had worked for the Medical School for many years. When I came to Vanderbilt the father had been retired on a pension. In the early years of the School he and his opposite number in the Department of Anatomy provided cadavers for that department. Had they been in the armed services they would have been awarded the Purple Heart although perhaps not for wounds received in combat because when they were shot they were running away as fast as they could.

Ossie had had musical training at Fisk and did extensive moonlighting in that field. He trained most of the colored church choirs in Nashville.

For the first ten years after the establishment of the School the Medical School Christmas party was an event second only to Commencement in importance. It was given by the employees for the faculty as an expression of their appreciation of the consideration shown them by the staff. It was symbolic of the family feeling that pervaded the whole school. Most of these people were sober, middle-aged individuals who were proud of their association with the School. In those days such an association was a distinct status symbol among their people.

The faculty cooperated. There was a big Christmas tree and each department contributed to a fund for the purchase of presents. These

were distributed by a "Santa Claus" impersonated by Dr. Cullen while he was here. The entertainment was a musical program of folk and religious songs performed by the employees trained and directed by Ossie. He was permitted to leave the Department at three o'clock every day after Thanksgiving to do this job. He did it well. There was considerable talent among the employees and the program was an enjoyable one attended by all the staff and their families.

But as the years went by Ossie got delusions of grandeur and brought in outside artists to add quality to his program. This, of course, detracted from the family spirit of the affair and when he brought in from East Nashville a soprano voluminous both physically and vocally and, with her, sang a duet "Oh, That We Two Were Maying" he administered the "coup de grace" to the annual Christmas party.

In the early years we were all poor. From the meagre (in the light of modern times) department budget we paid salaries, purchased supplies for teaching, maintained the physical condition of our departments and supported research. Grants in aid were small and rare. Mr. Mallinckrodt of the Mallinckrodt Chemical Company in St. Louis was a personal friend of Dr. Lamson and one year gave him \$10,000 to finance his research. We would stop and bow three times when we passed him in the corridor!

The Commonwealth Foundation gave to the School a grant of \$10,000 which was known as the "Fluid Research Fund". It was administered by Dean Leathers. From it we could get sums of \$100 to \$500 to supplement other inadequate funds. There were other small grants of this size received from drug houses and other sources but these were miniscule compared with present day grants. And whereas I felt elated to get a grant of \$500 from the Fluid Research Fund, Dr. Darby can now write a letter, invest eight cents in an Airmail stamp, and in forty-eight hours have a grant as large as my annual budget!

The students too were poor and many were dependant on their own efforts to stay in school. There were student loan funds but I remember only one sizeable fellowship. The Commonwealth Foundation gave each year to three first year students a grant of \$1000 per year for four years if they would agree to practice medicine in a rural community for three years after finishing their training. These Fellows were the plutocrats of the School. Immediately on receiving their stipends many of them did two things - bought a car and got married.

Less fortunate students resorted to all sorts of devices to support their education. For several summers two or three students tramped the mountain roads of East Tennessee selling Bibles. This was a lucrative business but I suppose in time the market became saturated.

Some jobs were passed from one generation to another such as teaching chemistry in a school for embalming. For several years two or three seniors served as interns in the hospital of the State Penitentiary but the faculty frowned on this and the practice was eventually abolished.

There was a rumor that one girl arrived with a total capital of five dollars. She borrowed from the student loan fund to get in school. But she did all right - she married an instructor.

One student was allowed to live in an attic room in one of the campus buildings. We knew that he was without the usual conveniences but not until he was brought into the hospital in a state of collapse did we realize that he lacked not only heat but also food.

But I understand that nowadays a student who pays all his own expenses is as conspicuous as was a Commonwealth Fellow.

And so I can look back over sixty interesting and sometimes hilarious years feel that I have indeed been fortunate - I have seen great things.