SCIENCE

VOL. 88 FRIDAY, OCTOBER 7, 1938 NO. 2284

The Practice of Medicine: DR. RUFUS COLE 309

Obituary:
Ernest William Brown: DR. DIRK BROUWER. *Willis Ray Gregg:* DR. W. J. HUMPHREYS. *Recent Deaths and Memorials* 316

Scientific Events:
The Standardization Work on Photography; Awards of the Lalor Foundation; The Beit Memorial Trust for Medical Research; The Industrial Research Institute; Damage Suffered by the Arnold Arboretum from the Hurricane 319

Scientific Notes and News 322

Discussion:
War and Science: DR. F. R. MOULTON. *The Westinghouse Time Capsule:* DAVID S. YOUNGHOLM. *The Salaries of Men of Science Employed in Industry:* PROFESSOR E. L. THORNDIKE 324

Scientific Books:
The Tsetse Flies of East Africa: PROFESSOR CHARLES A. KOFOID. *Television:* DR. S. A. KORFF 328

Reports:
The Research Council on Problems of Alcohol 329

Special Articles:
Influence of Adrenalectomy on Anterior Pituitary Ketogenesis in Rats: DR. I. ARTHUR MIRSKY. *The Chemical Nature and Nomenclature of Choline Derivatives:* DR. ARNOLD DEM. WELCH. *Biological Determination of Vitamin B_1 (Thiamin) in Rhizobium trifolii:* P. M. WEST and PROFESSOR P. W. WILSON 332

Scientific Apparatus and Laboratory Methods:
Apparatus to Assist in Photographing Experimental Material: PROFESSOR L. H. ADDINGTON. *Photoelectric "Colorimeters":* DR. P. E. KLOPSTEG 335

Science News 10

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

New York City: Grand Central Terminal
Lancaster, Pa. Garrison, N. Y.

Annual Subscription, $6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary in the Smithsonian Institution Building, Washington, D. C.

THE PRACTICE OF MEDICINE[1]

By Dr. RUFUS COLE

HOSPITAL OF THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH

HAVING lived until recently in the shadow of this enormous and beautiful pile of buildings, comprising the New York Hospital and Medical School of Cornell University, I am somewhat embarrassed to stand before this august assemblage of faculty and students and presume to bring you a message. My awe is a little tempered, however, by the recollection of a remark made by the Minister of Health of Egypt, who visited me at the Rockefeller Hospital several years ago. Thinking even one whose life had been spent in proximity to the pyramids might be impressed, I called his attention to your buildings and asked him what he thought of them. "I can tell better after a thousand years," was his cryptic reply. To-day the recollection of his remark makes me conscious of the ephemeral nature of most human undertakings, especially of commencement addresses, and boldens me to speak frankly.

[1] Address delivered at the commencement exercises of Cornell University Medical College, June 15, 1938.

To you, members of the graduating class, I offer my most sincere congratulations, and they are especially warm on this occasion since the degree which you have just received has real significance; it has been obtained only after a long residence in the university, and after you have carried on work as arduous, as intensive and as truly intellectual as that required by any university in the world for the doctor's degree, even for one in philosophy or in pure science.

Until a relatively few years ago the degree of doctor of medicine, even in the best universities of this country, signified something quite different from this. In almost all schools the chief emphasis was laid on vocational training. All of the teachers spent at least a portion of their time in private practice and, in selecting the material which they presented to their students, they chose that which was likely to be of immediate value in professional activities. Gradually, however, the teaching in the courses of the first two

years came into the hands of men whose interests were not entirely related to the utilitarian aspects of their subjects. These men devoted their entire time to teaching and study in their respective fields, and the work of the first two years became of a real academic and university type. In the third and fourth years, however, the character of the work was not changed, the chief emphasis continued to be laid on the vocational aspects, the objectives of the teachers were to train students to make rapid diagnoses, to apply the forms of treatment considered to be most effective, and to provide their students with sufficient actual experience with patients that they might learn to prognosticate correctly the outcome in any individual case. At the completion of the medical course students were given the degree of doctor of medicine, "with all the rights and privileges thereto appertaining," indicating that they were competently trained physicians fully prepared for practice.

The concept of the duty of the university, however, has now shifted. Since, as has been assumed, probably nine out of every ten men receiving the degree of doctor of medicine will spend the greater part of their lives in practice, it is obvious that the great desire of the university is still that society shall be provided with good doctors. This, however, is very different from an obligation to provide the community with trained practitioners. It may even be questioned whether the university is under any obligation to produce trained physicians at all, or is in a position to do so if it would.

During the last half century medicine itself has become a science. I do not intend to-day to discuss the definition of science. During recent years this matter has been sufficiently labored in connection with this very branch of knowledge, and in this debate even I have not been entirely silent. In any case, at the present time, when in the minds of many, even the educated, almost every field of human endeavor has become scientific, the term has lost much of its significance. Farming, hair-dressing, the giving of alms, office management, banking, horse-shoeing, and so on ad infinitum, all have become scientific. In all fields the outward trappings of scientific procedures have been adopted; numerical enumeration of items, at least when there are more than one, and especially when accompanied by graphs and charts, is sufficient to warrant the appellation scientific. It is not necessary, however, to worry about all this pseudo-science which surrounds us on all sides, even in the universities themselves.

I think even the most academically minded now agree that the subject of medicine, of disease, is a sufficiently important subject, and the mass of knowledge concerning it is sufficiently well organized and systematized to justify its designation as a science, and that its devotees, since they are pursuing its study by methods which are employed, and have been successful, in the other fundamental sciences, are worthy to be called scientists. Under these circumstances it seems that medicine is a proper subject to be taken into the university as a discipline worthy to be studied, even if all applications were entirely lacking.

But even if medicine is a science worthy of treatment by scientific methods, the question still remains whether there are any reasons why the future practitioner of medicine should pursue this subject from this point of view. It is theoretically possible that a student might, merely through repeated observation and didactic instruction, become familiar with the characteristic superficial features of disease, that he might learn empirically the various procedures employed in treatment and that he might even, through experience alone, acquire a certain skill in prognosis. Indeed, for many years this was about all that was attempted in the training of physicians. But the university, and even society at large, now demands that physicians shall be familiar with what is known about the nature of the processes constituting disease and of the lesions associated with them. The phenomena of disease are natural processes occurring in conformity with the laws of nature, so far as these are known at present, and these phenomena can only be understood by using the methods universally employed in revealing the mechanisms of other natural events. These are the methods of science.

During the period of your residence the university has placed facilities at your disposal to enable you to become scientists. It assumes that you have made good use of these opportunities. You have acquired much knowledge, but more important, it is hoped that you have obtained mastery of a method. The university, therefore, welcomes you into the society of scholars.

I take it that during your work in the university some of you have become especially interested in the subject-matter and the techniques and methods of one or other of the so-called underlying medical sciences, such as physiology, anatomy or biological chemistry, and have decided to make the study and teaching of one of these branches your life work. The division of science into several disciplines is a purely artificial one and only occurred when the accumulated knowledge became so great that no individual could be a master of the entire domain. The aspiration of Francis Bacon was found to be one impossible of fulfilment. On the other hand, the most productive scientists have been those who have not surrounded themselves by a closed wall, but have provided numerous apertures through which they could pass, to roam in

surrounding fields at will. Anatomists now study function, and physiologists, structure. Chemists bring their technique to the solution of important immunological problems, and even professors of medicine attempt to solve questions concerning disease by the employment of the methods of physics. For the advancement of knowledge the important matter is the formulation of problems. In the attempt to solve them each worker must use the tools to which his hand is fitted. Most of you have undoubtedly read the life of Madame Curie and have been inspired by learning how, through the exercise of her indomitable will, she overcame obstacles and accomplished her purpose. Don't worry too much about the nature of the path, whether it be rough or smooth; keep your eye on the goal. What you have learned of the science of medicine will make you better able to teach, inspire and lead those who will practice, no matter which field of biological science you now or later decide to cultivate.

Some of you undoubtedly hope to give your entire time to the study of the science of medicine itself and to become university professors of medicine or to spend your lives in attempting to solve the riddles of disease. For you the training in the underlying sciences has been indispensable. You can not study alterations in form or function without clear ideas concerning that which is changed.

Most of you, however, will engage in the practice of medicine, and to you I would speak especially. The university believes that it has made it possible for you to become good doctors of medicine. But are you now trained physicians ready for practice? That is another matter.

The statement made by Professor George William Palmer in the life of his wife, Alice Freeman Palmer, deserves repetition. In recounting her interest in domestic affairs, in spite of her preoccupation with intellectual matters, he says, "When at one time she was struggling with a new cook on the subject of bad bread, and after encountering the usual excuses of oven, flour and yeast, had invaded the kitchen and herself produced an excellent loaf, astonished Bridget summed up the situation in an epigram which deserves to be recorded; 'That's what education means—to be able to do what you've never done before.'" But does that suffice when dealing with such a complicated subject as disease, with its protean manifestations and with the life of human beings at stake? If the experimental loaf of bread turns out sour or heavy you can throw it out and begin again.

You may have knowledge of the structure and functions of the human organism in health, even knowledge of a kind which Huxley describes as "the sort of practical, familiar, finger-end knowledge which a watchmaker has of a watch, and which you expect that craftsman, as an honest man, to have when you entrust a watch that goes badly to him," a knowledge to be had only by long concentration of your minds for long periods of time "upon all the complexities of organ and function, until each of the greater truths of anatomy and physiology has become an organic part of your minds—until you would know them if you were roused and questioned in the middle of the night, as a man knows the geography of his native place and the daily life of his home." Moreover, you may also know about disease so that you may be able to picture in your mind at a moment's notice the characteristic lesions of all known diseases, and may be able to pass a perfect examination on all that is known of the functional disturbances following all types of injurious agents, and be able to describe minutely the lesions produced by them. In spite of all this, in my opinion, you would not necessarily be a good physician. Though the physician speak with the tongues of professors and savants, and have not experience and technique, he is become as sounding brass or a tinkling cymbal. It is absurd to assume that you are able to employ surgical methods successfully or to employ the various techniques now used by physicians in treatment. Even to make diagnoses with the rapidity which is necessary in actual practice requires the use of tricks (in the best sense), particular modes of thought and action, with which you are not familiar. In other words, there is such a thing as the technique of practice and those who deny it have never had the experience of being put to the test. This technique you have not learned and can not learn in the true university medical school. Indeed, that school best deserves this title that bothers itself least with attempting to do what is impossible. Moreover, no one, except the self-deluded men who examine you for license to practice, expects you on graduation to be proficient practitioners. This does not mean, however, that you are not well prepared to master the techniques necessary to make you good physicians.

It is not easy to differentiate sharply between the study of the science of disease and the practice of medicine. It is largely a difference of point of view, of emphasis. One may say, however, that the student of the science of disease investigates disease as it affects mankind. The practitioner is primarily interested in the diseased individual. The former may be interested in features of disease which at the present state of knowledge may seem to have little or no significance. The physician, for practical reasons, must concentrate his attention on those features whose importance has been demonstrated. It is not merely a matter of conservation of time, though this is important. The university student may spend days in the investigation of a single case. The practitioner must inves-

tigate, judge and act quickly. Otherwise he starves to death or most of his patients receive no attention whatever. The university lays stress on complete understanding, practice lays stress on skill. It is not a question of treatment. The movement at the end of the last century took care of that. The patient no longer employs a physician merely to have him administer remedies. He comes to the doctor when he is suffering from disease, he wants to be restored to ease or to be relieved of his ails when he has an ailment. But what the patient rightly demands, first of all, on the part of the physician is understanding. Not merely understanding of the physical disharmonies which constitute disease in the abstract, but understanding of his entire constitution as an individual. Both the university student and the practitioner are interested in treatment, but the practitioner is especially concerned with the techniques employed in actual application in the individual case. Whatever the differences, however, the university student and the practitioner must both employ the methods of science. They must both have the scientific habit of mind, and this is especially what the university should give. Both must have curiosity, the desire to learn; both must have honesty, and both must be critical. Unverified opinion can have no place as guides to action. To the practitioner every individual case presents a problem. He must observe, reflect, form an hypothesis and proceed to verify it. The analogy with music is not unilluminating. The study of the theory of music, its history, its relation to psychology are true university subjects. Training of students to be proficient performers on a musical instrument is not a legitimate function of the university, though it is true that some so-called universities so consider it.

Now if you have not yet acquired the necessary technique and skill for practice, where and how are you going to get it? There is no open sesame. It can only be acquired by practice itself and by hard unremitting labor. That does not mean that you can not be aided by observing the methods of master workers, but you can never acquire it through the best correspondence schools of our most famous universities. In earlier years the rudiments of the technique of practice were obtained by following a preceptor, and, so far as it went, this was not a bad way, though it had manifest disadvantages.

To-day the preceptor system has been replaced by the hospital internship. According to the *Journal of the American Medical Association* there are to-day 712 approved hospitals with positions for over seven thousand interns. In addition, there are three thousand positions open for residents in special hospitals. The total number of graduates from approved medical schools last year was 5,377. It is evident that every graduate in medicine has the opportunity to spend one or more years (in a considerable number of instances with pay) in obtaining experience in practice as hospital interns, and almost all graduates now make use of this opportunity. In my opinion there are manifest defects in the intern system as it exists at present. Indeed, I feel that it is the weakest link in present-day medical education. The analogy of the apprentice and the intern has been taken too literally. In most cases all the hospital does is to offer opportunities to the intern. The preceptor cared whether the student did or did not learn, the hospital usually does not care. But hospital physicians can be interested in the training of interns, to their own as well as the student's great advantage. Hospital authorities can undertake more seriously their educational responsibilities.

What can the hospital do? In the first place, it can realize that its group of interns is composed of highly educated, cultivated, serious men whose highest ambition is to serve ably the patients who are under their care, and whose greatest desire is, through practice, to become not only technically skilful, but also more gentle, more humane, more wise. The hospital can provide facilities so that interns may live like cultivated men and students, not like traveling salesmen, and this does not mean luxurious lounges, more bathrooms, better plumbing and luxurious food—not provision for higher standards of living, but for higher standards of work and study. This was clearly recognized by John Billings, a man whose wisdom and greatness we are only gradually coming to recognize, the man who was responsible in large measure for the success and enormous influence of three great institutions, the Johns Hopkins Hospital, the unsurpassed Army Medical Library in Washington and the New York Public Library. When he planned the Johns Hopkins Hospital the residents' quarters were placed in the best part of the main building, large, light, airy rooms with commodious book shelves, and, most important of all, they were in proximity to the library. He realized that the library should be a good one, freely accessible, so that interns not only may read there but that they may take books to their rooms, as many as they like. Hospital libraries should not be mausoleums or storage warehouses. In recent years when visiting hospitals I have made a point of seeing the interns' rooms. What do you think I usually found, even in some of the best and most modern hospitals? Small, dark rooms, containing a bed, a chair or two, a small desk, apparently little used, possibly a few photographs of members of the family or of those who at some future time might become members of the family, and a few books—a very few, and these mostly text-books,

remnants of the student life. I didn't feel so disappointed not to find some evidences of interest in literature or music or pictures, though I am not one of those who believe that culture in the best sense is of no importance in the life of a doctor, but I was surprised to find no evidence of any interests at all, not even an interest in science. To find that a young man could not only go through college but have acquired a university degree and have no interests outside of his daily job did surprise me. While the hospital can not create these interests, it can at least assume that the intern has them. The hospital should not treat interns as employees, make them punch a time clock (of course figuratively) and provide to the minutest detail the kind and amount of work they shall perform. Interns must have freedom. This I realize in large hospitals is difficult, but it is not impossible.

In discussing the responsibilities and opportunities of the visiting physicians, I can only look back on my own hospital days and recall my experiences under Dr. Osler. I feel that he was an ideal chief. Personally interested in every intern under him, considerate of their sensibilities as he was of their time, he seized on every least evidence of curiosity on the part of an intern, stimulated his interest and aided him with advice and help. As those of you know who have read his great biography, his contacts with his interns were not entirely confined within the hospital wards. He never missed a meeting of the various hospital medical societies. I once remember when he was hurrying off after dinner to one of these meetings, an attractive young assistant was drumming on the piano. "Jim, aren't you going to the meeting?" "No, I don't get much out of these meetings." "Do you think I do?" was the reply, and he slammed the door and ran down the steps. But above all he influenced his interns by his example. He taught them how to become good doctors by being one himself. He was interested in his interns, and this every hospital physician can be.

It has sometimes been felt that practitioners no longer have opportunities to help and guide young men and that, as a result, the day of great clinical teachers is past and that society thereby suffers. As a matter of fact, all practitioners connected with the large hospitals now come daily into contact with a group of highly educated young men who are, or should be, familiar with the fundamental nature of disease. By spending a limited amount of time with them, by guiding them, working with them, these practitioners may be of very great educational service. The opportunities for their own development are also there, the greatest teachers have always said that they received more from their pupils than they gave. Moreover, these opportunities are no longer confined to the large centers. With the development of hospitals in the smaller cities, frequently as well equipped as those in great centers of population, the practitioner in a small place now has the same opportunity to become a great teacher as had Daniel Drake in the little Transylvania University beyond the mountains. A group of skilful and devoted physicians in a country hospital who give themselves to the inspiration and training of their interns can to-day cause a path to be beaten to their hospital doors by the best educated young men in the science of medicine that have ever been produced. Young men have a way of being drawn to those who have something to give.

But after all, whether interns shall become good doctors or not depends upon the interns themselves. To make use of the knowledge you have obtained in the university and to retain your scientific spirit now become your chief concerns. In order to obtain complete understanding of your patients it would be necessary to study everything connected with them. Of course, that is impossible and much must be omitted. The matter of picking and choosing your procedures becomes of great importance, and the facility of doing this wisely is one of the qualities that determine the good physician. Our hospitals are now great organizations in which there are arrangements for making all kinds of technical investigations. The intern becomes a part of this organization, and he is able to use any one of a dozen different laboratories to aid in his study. This is all very useful, but it carries with it obvious dangers. The student begins to deal with formulae, with words, instead of with the things themselves. In the middle ages medicine was in the hands of physicians, surgeons and barbers, and, as Garrison says, "the barber was in some respects the most worthy of the three, since he was driven to study nature at first hand." One of the chief disadvantages of the present arrangement is that when the intern becomes an independent practitioner, as most of you will and must, this convenient arrangement for calling on others will no longer be available to you. Aid you must and will have, but it must be more carefully chosen. At the present time a large part of the work of the contributing services in the hospital is probably unnecessary. It results from the fear of omitting something. Seeking for completeness is mistaken for striving for perfection, which is the aim of the artist in every field. The best painters have not been those who have attempted to depict each individual hair. It is this fear of omission that impels taking the most minute and extensive histories, and the recording of routine elaborate physical examinations, all of which occupy so much of the intern's time and leave so little opportunity for thinking and for independent action. It is unnecessary for me to attempt to mention the numerous laboratory procedures that have been introduced in recent

years and have come to be employed in a routine, instead of a discriminating, manner. All this is not science. Darwin didn't make and record all his numerous observations for the sake of completeness. He early formulated an hypothesis, which he was attempting to verify. The intern should be given opportunity to employ the methods of science in solving his problems, not to become mere clerks and technicians. That not all interns take advantage of opportunities when they have them is obvious. How many interns keep their own records of cases, classify them, brood over them, and try to formulate their own pictures and concepts, and try to rationalize the methods of treatment they employ? Records of cases carefully abstracted, compared and digested are of infinitely greater educational value than random experiences, however exciting and interesting. To pass through your intern years in a fever of agitation, interested only in obtaining a rapid series of impressions, will add little to your real experience or improve your training for practice. Stimulated to collect and record and abstract all the cases of pneumonia occurring in the hospital during my own intern years, this practice gave me an interest in this disease which has never left me and has proved to be a source of great and rewarding satisfaction. It has been said that if a student learn syphilis he knows medicine. This can be said of any disease. An interest in any condition will lead a student into paths covering the whole range of pathology.

The life of an intern to-day is difficult. His duties are many and arduous. But the difficulties are not so great that they can not be surmounted. When I see the long lists of interns and residents in good hospitals, and contrast this with the handful of workers forty years ago, I can not believe that, in spite of the great increase in the methods employed, the intern's life need be more strenuous to-day. The master-word in the hospital, as in the university, is still *Work*. I once had a temperamental resident from one of the Balkan states who told me that he was ready to die for science. My reply to him was that it is much more important to work for it.

Hospital days are and should be laborious days, but they also may be days of the greatest joy and pleasure. For the first time you will come into a position of real responsibility for the lives of your patients. If it is the right kind of a hospital you will enter intimately into the lives of fellow human beings and see them stripped as bare of all pretense, of all artificialities, of all their former surroundings as they are of their clothes. It is a cold and unimpressionable individual who is not strongly moved by this close contact with those who are in distress, who are laying bare their deepest secrets and thoughts, who frequently are seeing death eye to eye. Your relation to your patients may resemble that of the family doctor. The close companionship with your associates, who are undergoing the same experiences, makes for sympathetic fellowship and stimulates close and enduring friendships. The companionships of school days, the attractions of college and club life can never make the same impression as do the hospital intern days.

During your intern days the hospital should be your home, your workshop and your playground. You should need nothing more. Learn to shun outside affairs that will complicate your life and disturb concentration on your work, rejoice if you are too poor to own an automobile to carry you from the straight road, avoid the movies, you will find sufficient tragedy as well as comedy close at hand, above all, avoid like a plague entangling affairs of the heart. This latter advice in these days, I fear, is like locking the stable door after the horse is stolen, since hospitals are now hard put to it to find interns that are not already married. But after forty years of hospital experience I am still convinced of the soundness of Dr. Osler's advice to "put your affections in cold storage during your intern years." The joys of family and domestic life will be all the greater because waited for and worked for.

And after the hospital will come practice. As you know, this word is employed in two ways, first, as the musician practices to acquire proficiency, and second, as the doctor or lawyer practices to pursue his profession. When we speak of practicing medicine let us not forget the implication of the word, through practice we become proficient. Bear in mind that education does not end with the intern years, it should extend throughout your entire professional life. Power grows as experience extends. The difficulties of maintaining a scientific attitude will be enormously increased once you have left the protecting walls of the hospital, no matter how insecure that protection has been. Amid the distractions of domestic life, the competition and rivalry in professional work, hurt by the apathy of the public for intrinsic merit,—whether you will be able to continue to exercise the scholarly and scientific point of view will depend largely on the use you have made of your hospital years. The best guard against retrogression is a constant desire to learn more about the real nature of disease, and particularly about some particular disease. In other words, have a problem. Of course, with all the distractions of practice, the methods you use will have to be comparatively simple ones. But if you are supplied with understanding and insight, microscopes of low power are sometimes able to reveal important truths. Some of the most important medical discoveries have been made by men in active practice. Time extends for those who have a driving passion to learn. The

example of Dr. Meltzer should impress all of you. For many years he drove about New York every day with a horse and buggy seeing patients; then, tying his horse to a hitching post, he spent all the time he could spare in a laboratory. During this period he made most important contributions to medicine and physiology. Later, after the Rockefeller Institute was established, he went there to work, and died one of the most productive students of disease that our country has had.

To maintain the scientific habit of mind it is not essential that a physician work in a laboratory, but, if he has curiosity, it is almost certain that he will be drawn there at least occasionally. Thirty years and more ago the physician who kept a microscope under a bell jar in his consulting room was spoken of with derision. How much more serious to-day that so many young doctors with wonderful scientific training, even if they have a microscope, never look through it from one year's end to another. Many, possibly most, men now in practice have no laboratories of their own, and many never enter a laboratory after their student days. All of them, however, hire technicians or send specimens to some commercial laboratory for the most complicated tests. Most of them are of the routine variety, done by technicians who have no conception of the meaning or purpose of what they are doing. Doctors have their patients pay large sums for blood examinations or for "having blood chemistry done" (whatever that may mean, and the doctors themselves frequently do not know) or for routine x-ray examinations that may be useless so far as the patient is concerned, and are of no real interest to the doctor. All this is not science. Let us take care that in the process of attempting to make medicine more scientific, physicians themselves do not become less scientific.

In spite of all that I have said, there is no question but that the practice of medicine to-day is far better than it was forty years ago. But one sometimes wonders whether, considering all the great additions that have been made to our knowledge of disease, and in view of all the time and money and thought that have gone into medical education, the doctors of to-day are really as able as we like to think. When one considers how slowly and ineffectively and incompletely therapeutic measures which have well-established value have been applied, such as those which are useful in syphilis, diabetes, pernicious anemia and pneumonia, to mention only a few, one wonders. That it has been necessary for governmental agencies to engage in active campaigns to promote the proper and extensive use of these and other therapeutic measures is a sad commentary on our profession.

Certain critics blame the defects entirely on the present method of university education. They say that it is suitable only for the few gifted students and not for those who are to compose the rank and file of the profession. Some would have training for practice carried through the entire four years of the medical course. Others believe that during the study of the underlying sciences more stress should be laid on practical applications. It seems to me that these ideas arise from mistaken notions, sometimes even by the universities themselves, as to what the university is attempting to accomplish, and above all from an entire disregard of the educational importance of the hospital and of practice itself. It is obvious that men undertaking the work leading to a doctor's degree should have the proper background and training and have the mental qualifications required for true university work. They should have that desire to learn, that devotion to learning, that inflexible will that is necessary if one is to lead the true intellectual life. They must be interested in the subject itself, and disinterested in the material rewards, social opportunities and stimulating emotional experiences associated with the practice of medicine. They must regard the practice of medicine as an intellectual and humane undertaking, a vocation, not merely an occupation, a learned profession, not a skilled craft.

Do the university schools of medicine treat the students as independent, thoughtful workers, stimulated by an insatiable curiosity and moved by an inordinate desire to learn, and have the various departments been organized with an eye to providing students with opportunities to effect this will and satisfy this desire? If the will is not fixed and the desires undeveloped, is the main effort, by example rather than by precept, to stimulate the development of these qualities and inspire these enthusiasms? These, to my mind, should be the important endeavors, rather than to urge the students to acquire all available information. The employment of laboratory methods alone will not accomplish these ends. To carry out required laboratory routine procedures may enable students to learn and understand more easily and may make information more real, but unless the work is conducted by the students in an independent manner and they be given opportunity to learn for themselves, the students will acquire nothing more than bare facts, facts which some of them at least could have obtained more rapidly and easily from books. While certain students may be more readily stimulated to work and study in their earlier years if the relation of the underlying sciences to disease is indicated to them, it seems to me unimportant whether the professors in these sciences are familiar with medicine or not, that is, whether they possess degrees in medicine. The great school of physiology that developed under the influence of Michael Foster was in Cambridge, far removed from departments of medi-

cine. And it has exerted an enormous influence, not only on the increase of knowledge concerning disease but on the practice of medicine and on practitioners as well. Let students obtain a real interest in physiology and, if they have intelligence, the bearing of physiological facts will be obvious to them when they study about disease.

That medical students at present acquire an enormous fund of information is certain. In interviewing students fresh from the schools I frequently stand amazed by the fluency and skill with which they discuss the most complicated subjects of physiology and pathology and the very latest discoveries in medicine and related sciences, at times even before the ink is dry on the reports. One sometimes wonders, however, if range of information is necessarily identical with depth of knowledge, or whether the facts have been digested and transmuted into wisdom. That medical students possess so much information is not surprising. For four years each of the various professors, and there are very many of them, have attempted to compel the students to learn everything that is known about his particular subject up to the moment of going to press. It is not necessary to recapitulate the large number of special divisions into which medicine has been divided; the students are expected to take at least a few meals in each one of them. There is so much hospitality that the meals all turn out to be banquets. Is it any wonder that most of the students have indigestion, mental as well as gastric? In recent years many attempts have been made to correct this situation, and they are undoubtedly in part successful, but I am sure many deans still have very bad hours worrying for fear their students will not have mastered every subject in the field of medicine. So far as I can see there is only one remedy. Let it be required that every professor, every teacher, each year pass an examination not only in his own subject but one in every other subject in the curriculum. Let the professor of biological chemistry keep familiar with the latest methods in obstetrics, the professor of ophthalmology be informed of progress in physical chemistry and endocrinology, the professor of bacteriology keep abreast of improvements in x-ray therapy. It is frequently held that at least once in their lives all medical students should have heard about all that is known in the whole field. A doctor should never be ignorant of any fact relating to medicine! But is this necessarily education on the university plan? Is this cramming with facts scientific education or does it produce scientists?

Over thirty-five years ago, long before the first university department of medicine was established, the following words were uttered by a man who was primarily a practitioner and clinical teacher: "All that the college can do is to teach the student principles, based on facts in science, and give him good methods of work. These simply start him in the right direction, they do not make him a good practitioner—that is his own affair. To master the art requires sustained effort, like the bird's flight, which depends on the incessant action of the wings, but this sustained effort is so hard that many give up the struggle in despair. And yet it is only by persistent intelligent study of disease upon a methodical plan of examination that a man gradually learns to correlate his daily lessons with the facts of his previous experience and with that of his fellows and so acquires clinical wisdom."

Let the university heed that it turns out men who have the scientific habit of thought, not merely men who are stuffed with facts. Let us, however, not ask too much of the university. If the prevailing standards of practice do not fulfil our expectations, let us not blame this all on the university, but let us keep in mind the parts which the hospital, the visiting physicians and even the interns and practitioners themselves should play in the training of good physicians.

If to-day I have attempted a "counsel of perfection" it has not been uttered in any spirit of arrogance or criticism. We are still far from the perfect state. The future rests with you who are beginning your careers. You are fortunate in the choice of your time. May you continue to be scientifically and critically minded. May you continue to be students as long as you live.

OBITUARY

ERNEST WILLIAM BROWN

IN any account of Brown's life his work on the problem of the motion of the moon must necessarily occupy the central place. At any time during a period of fifty years he was working on some phase of this subject. His lunar theory has justly been called definitive. The creation of this theory and the construction of his "Tables of the Motion of the Moon" are among the greatest accomplishments in the history of gravitational astronomy.

In the summer of 1888, then a student at Cambridge, England, he began the study of Hill's papers on the lunar theory at George H. Darwin's recommendation. In a series of publications beginning in 1891 he presented theoretical developments inspired by Hill's work, and their numerical application, *i.e.*, the coefficients of certain classes of inequalities in the motion of the moon. For six years he continued his preparatory studies. His mastery of the whole field is apparent in his "An Introductory Treatise on the Lunar