state aid given for its support. I understand that a bill has been introduced in Maryland to create a state university. The recognition by the state of medical education as a state function has come about so gradually and so naturally that its real significance and great importance have escaped the notice of most of us. When we analyze the whole problem and review the conditions and tendencies of medicine and medical education the world over we cannot escape the conclusion that medicine is rapidly becoming an important function of the state. What will this mean? It will mean state control and state support for public health, for medical licensure, for medical education, for medical research and to an increasing extent the medical care of the helpless.

The word "state" might be used in the broader sense so as to include municipal, state or national government. The constitution provides that public health and education are reserved as functions of the individual states. The American Medical Association has for years been striving to secure a national board of health. However important this is or would be, it is overshadowed in importance by the need of securing an efficient state licensing board in each state, and the importance of securing in each state the proper development of the functions of medicine, such as medical licensure, education and research. Our big problem is to create a public opinion by a campaign of education showing the great possibilities of modern scientific medicine. We must show what good can be accomplished both for the individual and for the community by efficient public health service, by well-trained practitioners and by medical research; and when we have educated the people we will have no difficulty in securing the necessary laws, machinery and funds to make medicine, in the best sense, a great function of the state. In developing this idea we must make one absolute condition, and this is that state medicine must be under non-political control safeguarded and out of reach of politics and placed on a scientific and educational basis, just as much so as is the United States Public Health Service to-day. When this idea is properly worked out of making medicine a function of the state in a thoroughly modern and complete sense, what will it mean? It will mean, first, a state health service with well-equipped laboratories, and commissioners of health in every county of the state with large authority, giving to the people the benefits of modern preventive medicine liberally supported by state funds. It will mean, secondly, a board of medical licensure with authority to demand thorough training of candidates who desire to practice medicine in the state and with power to protect the people against medical ignorance and inefficiency. It will mean, thirdly, a strong medical department of the state university situated, if possible, in the largest center of population in the state, provided with adequate plant and necessary funds and in medical control of the great state and municipal hospitals, eye and ear infirmaries, insane asylums, special hospitals, maternity hospitals and children's hospitals, so that the educational function of these institutions may be realized. Then the patients will be benefited by high-class medical service, and medical students and nurses will be given the best possible training. Fourthly, it will mean that in association with each department of the medical school and in all these charity hospitals there will be thoroughly equipped research laboratories.

In the future when medical education has become a state function, the great advances and discoveries made

in medicine in this country will come largely from the research workers in the medical departments of the state universities, from the great hospitals affiliated with them, and from the state boards of health. There should be a close working relationship between the state board of health, the county boards of health, the state university and the great charity hospitals; and, lastly, when we speak of medicine as a function of the state we must include the medical care of the submerged 10 or 20 per cent. of the population which does not and cannot provide proper medical care for itself. We are every day coming nearer the time when in this country we shall see laws enacted to provide, by some state insurance scheme, medical care for the poor as has been done for some years in Germany and as has recently been done in England. If the profession in this country is far sighted it will recognize these coming events and direct them wisely.

If this condition is brought about what will be the place of the medical schools in the older states such as Harvard in Massachusetts, Yale in Connecticut, Columbia and the others in New York? These schools will voluntarily become a part of the great machinery that will carry on properly for the state the function of medicine. Take as a concrete example Harvard. Harvard should so affiliate itself with the state board of health work of the state of Massachusetts, with the educational and research functions of the great state and municipal charities, that it can for such purposes carry on the functions of a great state medical school. In this work it should receive the support and recognition by the state.

In this conference we have almost every state of the Union represented. Let every delegate here carry back to his state this new gospel of American medicine, Medicine a Function of the State. The state board of health, the state licensing board, our great state and municipal charity hospitals and the medical department of the state university must be given adequate state support, must be put on a scientific and educational basis and must be taken out of politics and away from political influences.

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THE DANGER TO THE MAINTENANCE OF HIGH STANDARDS FROM EXCESSIVE FORMALISM *

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Every professional school ought to have two distinct objects—one the recruiting of the best talent that can be obtained among young men, and the other giving to them the best preparation for the career in which they are about to take part. These two objects are not of necessity inconsistent, but they do not always go together, and neither of them should be allowed to obscure the other. It is, indeed, one of the characteristic differences between education on the two sides of the Atlantic that Europe tends to a system of competition which selects the stronger men and eliminates the weak, while we, more democratic in spirit, fix our attention almost exclusively on the process of training

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that the men are to be put through. In this paper premedical education will be discussed from both points of view.

It would be presumptuous in me to question the validity of medical opinion on the content of the necessary premedical education, but one may properly inquire how well the rules adopted by this association are fitted to attain the object sought, and how far they may have the effect of excluding able men from the profession. It is needless to go so far back as the high school curriculum, because the subjects prescribed therefor are not especially premedical, and provide a good general education for any subsequent career. My concern is the rules adopted at the joint meeting last March of the Committee of the Association of American Medical Colleges and the Council of the American Medical Association about the courses to be taken in college. The requirements are one course each in physics, chemistry and biology, with a prescribed number of lectures and appropriate laboratory work; also a couple of courses in German or French aggregating three or four hours a week for the year. To what extent are these necessary or sufficient to give the preparation needed for medical study?

A concrete example will illustrate the bearing of the question. When a child, I spent a couple of years at school in France, could read the language easily and took no course therein at college. On the other hand, I took a course in German, but did not learn to read it well enough to be of any real use, and taught myself to do so in later life. If, therefore, I had sought to enter a medical school under these new rules, I should not have been qualified in French, which I could read, but might have been qualified in German, which I could not read. I say, might have been qualified, because I do not remember that the course in German was as extensive as required by these rules, but our experience at Harvard shows that this would probably have made no essential difference.

We oblige every student who does not pass an examination for entrance to Harvard College in both French and German, to take, in the language that he does not pass, a course equal to the minimum your new rules prescribe. Nevertheless, we have found the students commonly unable to use foreign books, and hence have recently required them to take an oral examination in reading either French or German. Each of them selects, of course, the language in which he is the least deficient, and yet on the average one-half of them fail. Such a result shows that the course in language your rules prescribe will by no means insure the attainment of its object—that is, the ability to use foreign books—while it may exclude a man who can use them perfectly well and has not complied with this condition for admission to a medical school for the very reason that he can use them. No doubt, the framers of these rules did not intend to compel such a man to go through the form of taking a course in a subject with which he is already familiar, and yet they made no provision for exception in his case.

Although less strikingly evident, the same thing is true in the case of the scientific requirements. Everyone knows that to pass a course with the minimum mark in one's freshman year in college indicates only a small knowledge and feeble grasp of the subject, and that even this may have disappeared well-nigh altogether by the time of graduation. But it is enough to comply with the formula, and, therefore, admits to the medical

school; while a knowledge and grasp perhaps much larger, acquired by a more mature man in a shorter space of time, will not comply with the formula, and, so, will not admit. Let me explain this.

A college education which has any value in training the mind must make men more capable of grappling with difficult subjects than they were before, and, consequently, must fit them to acquire mastery of a subject more rapidly than before they went to college. If so, a man ought to be able to learn a certain amount of physics, chemistry or biology in a shorter period and with less hours of lectures and laboratory work in his senior year than in his freshman year. What is more, he will present it when it is still fresh in his mind, whereas if he has taken it as a freshman, and then spent three years on other subjects, he will certainly have forgotten a great deal of the little that he learned. Yet for admission to the medical school the prescribed course taken in the freshman year is enough, while a shorter but more efficient course taken in the senior year or after graduation is not enough. We are to ask not what a man knows, but whether he has at any time taken a course with a fixed number of hours of lectures and laboratory work. In short, you are requiring not a result but a process; you are ascertaining not whether the man has a proper preparation for the study of medicine, but whether he has gone through a régime of training which may in ordinary cases secure the result desired, but which is sometimes not necessary for the purposes, and often inadequate. You are using a rough mechanical test which is inaccurate on both sides, instead of a personal test which would be far more accurate. Surely if an elementary knowledge of physics, chemistry, and biology is absolutely essential before a man begins to study the subjects taught in the medical school, it would be possible to find out whether he has that knowledge by examining him; and surely you can trust the medical schools on your accredited list to conduct such an examination; or, if you cannot trust them, you can inspect their examination in such a way as to see that it is thorough.

The mere fact that the test by courses taken is inaccurate, in that it lets in a certain number of men inadequately qualified, is only half, and perhaps not the most serious half, of the evil. The inaccuracy works both ways, and the fact that the test by courses may be fairly effective on the average does not justify it. A dying lawyer in remorse that his eloquence had enabled many guilty men to escape is said to have consoled himself with the reflection that the same eloquence had also sent many innocent men to the gallows, so that on the average justice had been done. Like his eloquence, the rule requiring certain courses to be taken in college for admission to the medical school does a double harm. It lets in men whose scientific preparation does not reach the standard desired, and it is liable to exclude a good many excellent recruits for the profession who have not selected their courses in college with a view to a medical career.

I know that many people, and among them members of the medical profession, hold a fatalistic theory of education. They believe that men are born to be physicians and surgeons, or at least are inoculated with the virus young, so that there is no need of taking into consideration men in whom the impulse toward medicine has not displayed itself early and forcibly. But like all theories, this is only in part true. No doubt, many men select their careers at an early age, but, on

the other hand, any one familiar with college students knows that it is by no means always the case. Often men of rare quality do not know what their career in life is to be until toward the close of their college years; in occasional cases not even then. Nor is medicine a complete exception to the rule. Anyone here can probably recall cases of eminent practitioners who did not decide to enter a medical school, and did not elect scientific courses in college, until too late to comply with these rules.

Some light may be thrown on this point by statistics compiled at Harvard a few years ago to measure the relative effect on work in the professional schools of high scholarship in college and of the pursuit of particular subjects of study.¹ The figures for the medical school cover sixteen years, and comprise the three hundred and sixty-five alumni of Harvard College who graduated from the school during that period.

It appeared that the proficiency in the first-year medical courses in anatomy and histology was roughly in proportion to the amount of science taken in college. But this initial advantage did not last long, and disappeared altogether when at graduation the *cum laude* was awarded for the work in the school as a whole. In fact, the percentage of *cum laude* degrees in medicine was almost exactly the same for the men who had concentrated their college electives in natural science and for those who had concentrated in other subjects. It was 51.2 per cent. in one case, and 52.1 per cent. in the other. Curiously enough the men who took less than three courses in natural science actually did a little better than those who had taken a very large amount of it.

One must not base too definite conclusions on these figures, but certainly they go far to show that a large amount of scientific preparation is not an essential, or indeed a highly important preparation for medical studies, and that a small amount is not a hindrance to successful work. No doubt a certain command of chemistry, for example, is necessary; and every physician at the present day ought to be thoroughly familiar with the principles of physics as well as of chemistry and biology. But this may be acquired in ways other than college courses.

The relation of rank in college to the work in the medical school proved, on the other hand, to be highly significant. Of the men who graduated from college without distinction only a little over one-third won a *cum laude* in the medical school; whereas, of those who achieved distinction in college, over four-fifths obtained a *cum laude* in the medical school without regard to the subjects they pursued in college, and this percentage was progressively greater in accordance with the degree of distinction attained in college. It would be interesting to have these statistics corroborated or controlled by similar ones from other institutions; but the number of cases is sufficiently large, and the figures decisive enough to show conclusively that for the study of medicine excellence in college work is more important than the subjects that have been pursued.

Now it is only for men who have done excellent work in some line in college, and who could be expected to do work of similar grade in the medical school and in the profession, that I plead. For the inferior scholars, or even the man of ordinary quality, I am not concerned. It may be unfortunate for him that he is not

allowed to study medicine unless he makes up his mind to do so early in life; but it is not an injury to the profession as it is in the case of men of unusual capacity. The standard of every professional school depends quite as much on the intellectual caliber of its students as on the eminence of its professors. The intellectual power of the student body has inevitably much to do with setting the pace, with slowing down or speeding up the instruction, and no school can afford not to welcome all the men of strong mental grasp that it can get. To men of this kind the medical profession should say, "Come." It should require them to acquire, whenever possible, the preparatory training needed, but surely it should not exclude them because they do not choose their profession at an early age. Many a man of intellectual force becomes interested in some subject which he wants to continue throughout his college course, and if he determines to study medicine near the end of his college days the new rules may compel him either to drop his studies in which he has taken an interest, or to forego the possibility of entering a medical school. He is placed between these alternatives in order to comply with a formula that is no measure of his capacity and a wholly inaccurate measure of his preparation. Can we not open the road to a man of that kind, instead of shutting the door in his face because he did not take prescribed courses in the prescribed way before leaving college? In the three months of his summer vacation a man of trained mind, with habits of industry and application, can learn as much as a freshman in half a college year. Moreover, if he enters the medical school with a part, but not quite the whole, of the scientific preparation needed, he can probably make up the rest as he goes along, just as a large proportion of students always must, if they try to work at high efficiency; the important matters being on the one hand that he shall acquire the necessary preparation before he proceeds to the course for which it is required, and on the other hand that he shall not be shut out because he did not acquire it in a specified way, nor cut off for what he can do, because of disability in other subjects.

Americans are a mechanical people who trust to machinery to do their work, maintain standards and save labor. But mechanical devices as applied to human beings are apt to be defective, and in education they present, at the present day, a real danger. This runs from the top to the bottom of the educational scale. Many of our colleges refuse to appoint instructors who have not taken a doctorate of philosophy, although many of the most eminent scholars in the country have not done so, and the books a man has published are a far better criterion of his scholarly qualities than any degree granted for work done as a student. The late William James made merry over a young man who returned to Cambridge to complete his studies in philosophy, not that he came for that subject, but he was nearer to a doctorate in it than in any other, and without a doctor's degree in something he could not obtain at a certain college an instructorship in English. To such a point had pedantry been carried!

At the other end of the educational scale our school grades are so rigid that, as a rule, a bright boy or girl must go up the ladder at the pace of the average child, and therefore cannot attain to higher education until after the time when it ought properly to be reached, and may often be constrained to lose it altogether. We have at last learned to provide special schools for backward

1. Educational Review, October, 1911.

children, but the unusually quick child has no less a claim to be developed to the full extent of his or her capacity.

Our processes of education are inelastic, and if adapted to the ordinary person are hampering to the unusual mind. Is not this because we fix our attention too exclusively on the process, instead of on the result produced? We laugh immoderately when we are told that the condition for admission to the bar in England consisted formerly in eating a certain number of dinners in the Inns of Court, yet that rule was well intended. It was designed to measure a residence in the Inns of Court, which was supposed to be accompanied by diligent study of the law. Are we not going a little in the same direction? Many of us have sat in a faculty and heard a discussion whether a man, who had done all his college work well, should be refused a degree because he had not removed an entrance condition; in other words, whether he could be given the formal certificate of having done his college work when, in fact, he had completed it, but had not yet proved that he was capable of undertaking it. Are not we, with our regulations about taking so many courses which are passed and dismissed from the mind, putting our student in much the same position of the Cook's tourist who visits a European picture gallery, looks at the pictures starred in Baedeker, checks them off and straightway forgets them? Can we not make our measure of education something better than the touching of a watchman's clock?

We tend everywhere to set up a standard based on courses taken and degrees received, although such a standard measures only the minimum required. In Europe excellence in scholarship is now highly prized and opens the way to success. In England, for example, the honors a man achieved with his bachelor's degree at Oxford or Cambridge are never forgotten, and have a momentous influence on his prospects in life; but we pay little heed to such things. We ask only how many courses he has scored with the lowest passing grade; and this habit of mind is especially dangerous in the case of medicine, because to judge from the college records of men who have entered medical schools, the medical profession has not hitherto recruited as many men of high intellectual force as it ought to attract. It is, therefore, especially important for it to avoid formulas which may tend to exclude men of unusual capacity.

Let me repeat. I am not urging the admission to medical schools of men with an inadequate preparation, but I am arguing for a measure of that preparation which shall be a real test of a man's knowledge not solely of the courses he has been through, and which will not, for a failure to decide early on his career, keep out the man of power.

(For discussion, see page 876)

"Sure Cures" for Every Disease.—Many people delude themselves with the false hope that there is some drug to cure every disease. Specific remedies may be counted on the fingers of our hands. Very few therapeutic agents rival quinin for malaria, salvarsan for syphilis or antitoxin for diphtheria, but even these must be properly administered in order to obtain satisfactory results. The common belief that there is some drug that will cure every disease is fostered by unscrupulous persons who boldly advertise "sure cures" for rheumatism, pneumonia, cancer, tuberculosis, diabetes and Bright's disease. These fallacies quickly disappear when people become better informed as to the limitations of the pharmacopeia.—M. J. Rosenau, in *Vermont Med. Month.*

ADMINISTERING THE PRELIMINARY COLLEGE YEAR IN CHEMISTRY, BIOLOGY, PHYSICS AND MODERN LANGUAGE*

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In accepting the honor of the Council's invitation to present a paper on "The Best Method of Handling the Preliminary College Year in Chemistry, Physics, Biology and a Modern Language," I have found it necessary to modify the title. Our experience at the University of Virginia has not been such as to enable me to bring before you a plan which has been extensively tested and which may, with confidence, be recommended to others. We have, however, been in a measure pioneers in this field, we have come into intimate contact with some of the difficulties of the problem, and we have been forced to think about these difficulties and reach conclusions as to the methods of handling them.

When, in 1906, the faculty of the school which I serve decided to require thereafter a year of college work in the basic sciences preliminary to medicine, there was not a school in the entire East between Canada and Mexico, with the exception of Harvard and Johns Hopkins, which required any amount of college work for admission. The entrance requirements at large of our own university were an indefinite quantity variously estimated as from one and a half to three years of high-school work. There was no use talking of a diploma from a four-year high school, because there was virtually no such thing in the territory from which we might expect to derive students. On the other hand, conditions in the medical school were such that something had to be done, and at once. Accordingly, we announced for the next year a requirement consisting of three years of secondary-school work followed by a year of college work in the sciences. In a way, it was an absurd thing to do. We simply shut our eyes and took the plunge. We found ourselves in much the same situation as the new-born infant of a distinguished anatomist, of whom his students relate that, when the nurse inquired how he would like to have the child bathed, replied, "Just throw her in the tub, and let her work out her own technic." Precisely why we did not drown, I do not fully understand. The adverse conditions mentioned above were rapidly improved, however, and in 1910 we were able to introduce a requirement of fourteen units of secondary-school work, followed by a college year. During the first two or three years we were not able to reach any satisfactory conclusion as to the real value of the actual minimum requirement, because almost the only applicants who could satisfy it were college graduates, and thus the average attainments of the new men were far beyond those represented by the entrance requirement. (Let me say parenthetically that our experience leads us to dissent emphatically from many of the criticisms that have been made of the college graduate; we find him an excellent fellow to have around.) Gradually the number of new men who had entered college solely to procure the prescribed preliminary education increased, and now the bulk of the class is furnished by such men; so that we are in position to form an opinion as to

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