proposed to settle the question of reaching the pole by aldermanic resolutions and straw votes in railway trains or even newspaper editorials.

If in the foregoing remarks I have touched superficially upon some aspects of science teaching rather than sounded its depths, I can not plead as my excuse failure to realize the importance of the topic. One of the only two articles that remain in my creed of life is that the future of our civilization depends upon the widening spread and deepening hold of the scientific habit of mind; and that the problem of problems in our education is therefore to discover how to mature and make effective this scientific habit. Mankind so far has been ruled by things and by words, not by thought, for till the last few moments of history, humanity has not been in possession of the conditions of secure and effective thinking. Without ignoring in the least the consolation that has come to men from their literary education, I would even go so far as to say that only the gradual replacing of a literary by a scientific education can assure to man the progressive amelioration of his lot. Unless we master things, we shall continue to be mastered by them; the magic that words cast upon things may indeed disguise our subjection or render us less dissatisfied with it, but after all science, not words, casts the only compelling spell upon things.

Scientific method is not just a method which it has been found profitable to pursue in this or that abstruse subject for purely technical reasons. It represents the only method of thinking that has proved fruitful in any subject—that is what we mean when we call it scientific. It is not a peculiar development of thinking for highly specialized ends; it *is* thinking so far as thought has become conscious of its proper ends and of the equipment indispensable for success in their pursuit.

The modern warship seems symbolic of the present position of science in life and education. The warship could not exist were it not for science: mathematics, mechanics, chemistry, electricity supply the technique of its construction and management. But the aims, the ideals in whose service this marvelous technique is displayed are survivals of a pre-scientific age, that is, of barbarism. Science has as yet had next to nothing to do with forming the social and moral ideals for the sake of which she is used. Even where science has received its most attentive recognition, it has remained a servant of ends imposed from alien traditions. If ever we are to be governed by intelligence, not by things and by words, science must have something to say about *what* we do, and not merely about *how* we may do it most easily and economically. And if this consummation is achieved, the transformation must occur through education, by bringing home to men's habitual inclination and attitude the significance of genuine knowledge and the full import of the conditions requisite for its attainment. Actively to participate in the making of knowledge is the highest prerogative of man and the only warrant of his freedom. When our schools truly become laboratories of knowledge-making, not mills fitted out with information-hoppers, there will no longer be need to discuss the place of science in education.

JOHN DEWEY

COLUMBIA UNIVERSITY

THE FUTURE OF THE MEDICAL PROFESSION[1]

Mr. President and Colleagues: We are here to rejoice over the union of the Ohio and the Miami Medical Colleges, which

[1] An address on University Day, December 1, 1909, at the University of Cincinnati.

have become one school, the medical department of the University of Cincinnati. Each of these schools has an honorable history. Leaders and pioneers in the profession have made up their faculties, and men of most honorable record are to be found among their graduates. This amalgamation has been accomplished at much personal sacrifice on the part of some connected with each institution. When any institution of the rank and prestige held so many years by each of these schools loses its individuality some of the dreams of the past must come to naught. This is by no means an isolated instance of the merger of medical schools within the past few years in this country. In various sections this has already been accomplished. The number of medical schools is decreasing and this decrease is being brought about by the profession itself. Not only is the number of medical schools being diminished, but in all the better medical schools the bars to admission are being raised higher each year. This is a commercial age and this is preeminently a commercial country, and yet the medical profession is ridding itself of commercialism. It is demanding of those who desire to enter its ranks a higher degree of culture and intelligence than is demanded of any other profession in this country. The average requirement for admission to our best medical schools is at least two years ahead of that demanded for admission to other professional schools, and after admission, from one to two years more of time is demanded for graduation. Our best medical schools are demanding a more advanced preliminary education of their matriculates, and more time in the course, and yet the financial inducements to enter the profession are falling year by year. It requires not only more time but more money to enter the medical than any other profession. In our universities in which both law and medicine are taught the students in the two schools pay practically the same tuition and annual fees, while in addition to these the medical student must pay extra laboratory expenses. A young man in my own state may, after finishing his high school, enter the law department of the university and graduate after three years, or, if he chooses, he may read law in an office for fifteen months, then enter the law school and graduate after two years. If he wishes to study medicine, after completing his high school course, he must spend at least two years in the collegiate department of the university before he can enter upon his medical studies, for which four more years are required.

Every state in the union has a minimum legal requirement for the practise of medicine, and in some this requirement is high enough to exclude all save those who have had the best training. This restriction is for the benefit of the people, and not in the interests of the profession. Unfortunately, these legal enactments fail to reach many pseudo-medical practitioners who still prey upon the credulity of the public, such as the nostrum vender, the advertising charletan, the abortionist *et omne id genus.*

The medical profession is giving liberally of its energy, time and money in every branch of sanitation. It is doing its best in the restriction and prevention of disease. Many of our best men are serving on state, municipal and village boards of health, often without any pecuniary remuneration, and in practically all instances without adequate financial reward. The physician not only pays the taxes upon what property he possesses, but day and night he is rendering extra service to the poor of his community, and it must be admitted that many of the well-to-do trespass upon his generosity. The clinic established for the

treatment of the poor is crowded with the rich, often to the practical exclusion of those for whose benefit the charity was intended.

Let us see what the condition of the medical man in this country is to-day. In order to enter a good medical school, he must have a better preliminary education than is demanded for admission to any other professional school. Having gained admission, he must spend more money and take more time in order to gain his degree than any other profession demands. Then the young man with his degree finds it highly advantageous to take one or more years of hospital work for which he receives no financial remuneration. Before he can offer his services to the public he must pass a state examination which is more rigid than that demanded of any other profession. Finally, having hung out his sign, he walks to his dispensary or hospital, where he offers his dearly bought skill and experience to the deserving poor, many of whom ride to the same place in costly motor cars. He serves without recompense upon boards of health, and does his best to prevent disease upon the existence of which his bread and butter depend. He writes papers and gives lectures upon sanitation, and the more his advice is accepted and followed, the smaller is the number of his paying patients. When he is treating a case of any infectious disease the physician, in preventing the spread of the infection, is rendering a service to the public, which as a rule is unrecognized and seldom rewarded. In legislative halls he is crowded aside by the followers of pseudo-medicine. If his name gets into the daily papers favorably in connection with any case under his charge, his professional brethren scold, while the bold advertisement of the nostrum vender, the so-called specialist and the abortionist stare at him from the pages of both the secular and religious press. He lectures on the prevention and eradication of tuberculosis, telling how people should live in order to prevent this disease. He says that outdoor life, good, wholesome food and sanitary surroundings are the essentials, and he helps to make up the millions annually required on account of the postal deficiency, while the government mail carries to the remotest corners of the county the lying promises of so-called consumption cures. He attempts to show how intemperance saps the health of body and mind and fills our asylums, while the most deadly forms of alcohol are freely sold at exorbitant prices under the delusive names of stomach bitters, celery compound, peruna, etc. He shows the deteriorating effect of venereal disease. He tells that a large per cent. of his gynæcological operations results from this cause, while the "restorer of lost manhood" sprinkles the pages of the Sunday newspaper with his nauseating "ads." He pays a high duty on the imported microscope with which he watches the agglutination of typhoid bacilli in his early recognition of the disease, preparatory to recommending measures that may avert the epidemic, while the sugar trust bribes the custom inspector and the corporation accumulates its millions. He pays a double price for the knife with which he removes the cancerous breast of the poor woman, because the steel trust must declare a dividend.

Twenty years ago there were many medical schools in this country, owned and controlled by their faculties, to the members of which there came either directly or indirectly each year a fair financial return on the investment. It did not cost much to inaugurate and maintain a medical school at that time. A suitable building with one or two large lecture rooms, a gar-

ret for a dissecting room, a small chemical laboratory, a museum with specimens from the clinic and some inexpensive apparatus for demonstrating the elements of physics and chemistry were the essentials. The session was only six months, and two sessions completed the course. The lectures were repeated each year and both classes attended the same lectures. Possibly some member of the faculty had a microscope, which might be seen, protected from the dust, under a glass case. It was rumored among the students that a drop of water seen through this instrument had been found to be teeming with life. Rarely some professor was bold enough to actually use the microscope, and possibly he exhibited diatoms, uric acid crystals and sections of bone.

This is all changed. The medical building with all needed laboratories and equipment costs hundreds of thousands of dollars. Skilled men giving their entire time to the work are demanded in all the laboratory branches, and even the clinician has but little time for outside remunerative work.

I do not think that I have overdrawn the picture of the present conditions of the medical man in this country. The medical schools that were paying properties thirty years ago are now being donated to the universities. Medical education has become so expensive that it can be provided only by institutions that are endowed or receive financial support from the state or the municipality. The advance made in medical education in this country in the past ten years is greater than that of any other profession. To fit one for the practise of medicine, higher preliminary training, more time and more money are required. Notwithstanding these things, the average income of the medical practitioner in this country is decreasing year by year. He does much for the public good for which he receives neither recognition nor reward. As a member of this profession I am making these statements without the slightest bitterness and even without complaint, because I believe that the profession is preparing itself to do the greatest good for the race, that it is in training to render mankind the highest service, and that its members in the near future must be leaders in an evolution such as the world has never known. I am by no means sure that the profession in general is to be credited with being conscious of the great work that lies before it, or of preparing itself for the high station to which it is to be called. The civilized world has reached a period in its evolution in which the educated medical man must play an important part. Without his help the development of the race can not proceed as it should. Man has reached a period in his development when he has become conscious of the fact that the great work of advancing his race towards physical, intellectual and moral perfection is a duty which falls upon himself. The creature has been elevated to the dignity and power of a creator and this imposes upon him a responsibility that he may not and can not avoid.

The history of civilization is being rewritten, and in the light of to-day there is being read into it a lesson that the world can not ignore. History has heretofore dealt almost exclusively with questions of politics, with literature, customs, manners, etc. The influence of disease upon the decline and fall of nations has been until recently overlooked. Professor Jones has shown quite conclusively that the plasmodium of malaria was the greatest factor in the decay of Greek civilization and did much to render the once virile Roman an easy victim to the more robust Goth and Vandal. The buried cities of Asia and

northern Africa fell into ashes under the withering curse of disease. In Spain the Moors reached a high degree of civilization. They built the wonderful city of Cordova and filled its great library with the most advanced science of the day. This people supplied the most skilful physicians of the time. Returned to Africa, their descendents degenerated into the barbarians whom to-day we know as the Riffs of Morocco.

Civilized people have come to a realization of the fact that disease constitutes the greatest bar to human progress, and that nation which first frees itself from the bondage of disease will dominate all others. In that land the superman will first be born. Two conditions are essential before any nation can free itself from disease. In the first place it must possess an educated, scientific medical profession. In the second place, the nation as a whole must be guided by the advice of its best medical men. With either of these conditions wanting no people will be able to advance.

Are we, the people of the United States, held in the bondage of disease? One out of every seven of us die of tuberculosis; fifty thousand of us perish annually of typhoid fever, and ten times this number lie stricken for weeks each year with this disease, but ultimately recover. Pneumonia disputes with tuberculosis the right to be called the captain of death. Some 50,000 of us die annually of cancer and other malignant growths, more than 25 per cent. of our children die before they reach five years of age. In short, more than 80 per cent. of us die from causes that are preventable, and which the enlightened nation of the future will prevent.

I am not sure that our nation will be able to fully comply with either of the conditions mentioned. I do know that the better medical schools in this country are doing their best to prepare the profession of the future for this work. Encouragement in regard to the second condition comes from the general interest shown in the recently developed campaign against tuberculosis, the large and small contributions in aid of this work and the ready response made by many of our state legislatures in the enactment of laws tending to restrict this and other infectious diseases; also from the generous contributions that have recently been made for the study and abatement of uncinariasis and pellagra. We, of the profession, have frequent cause for impatience with the laity for their indifference towards matters of public health, but we should remember that the attitude of the world towards the causation of disease can not be suddenly and completely changed. Disease has for countless generations been regarded as of divine or mystic origin, as an infliction from heaven, sent either in love or in anger. This old superstition still casts its shadow over us and consciously or unconsciously influences the conduct of many. It is difficult for a nation within a generation to cast off the superstitions of the fathers. This can be done, however, by instructing the children in sanitary matters. Leibnitz said: "Give me control of education for a generation and I will change the world."

What will be some of the functions of the medical man of the future? In my opinion, the most important of these may be grouped in certain classes, and it is of the greatest importance that these should be fully appreciated, especially by those interested in medical education. In the first place, that nation will be most favorably situated which does the most for the prosecution of medical research. Every scientific medical discovery so far made has been a blessing to mankind. Medicine has not been advanced by philosophical dogma; it has grown and has yielded its rich and

beneficent fruits only as a result of slow, laborious research. The chemist, bacteriologist, pathologist and clinician have obtained results, not by sitting in their studies or libraries and evolving theories from their inner consciousness, but by experimentation and close, accurate observation in their laboratories, and at the bedside. For more than a thousand years before the time of Pasteur there were occasional medical men who believed that certain diseases are spread by living contagions. In the fifth century before our era Empedocles of Agrigento taught that stagnant water breeds disease and he is said to have delivered the city of Selinunte from an epidemic of fever by draining a swamp in the vicinity. And yet, in the year 1905, twenty-four centuries later, according to Ross, out of a total population of about two and one half millions in Greece not less than one million had malaria and nearly six thousand died from this disease. About two thousand years ago Varro in his "Rerum rusticarum," in advising concerning the location of a country house, wrote as follows: "Adimadvertendum etiam si qua erunt loca palustria, et proter easdem causas, et quod crescunt animalia quædam minuta, quæ non possunt occuli consequi, et per æra intus in corpus, per os ac nares perveniunt atque difficiles efficiunt morbos," and yet the plasmodium of malaria devastated the fair fields of southern Italy and continued to hold sway, awaiting the time when a French army surgeon, Laveran, at an isolated post in the same malaria-ridden Africa, should demonstrate the cause of this disease, the giant enemy to the civilization of the Mediterranean coast. Then came the researches of Ross and others by which the part played in the distribution of malaria by the mosquito was demonstrated, and now the fertile lands of the Roman campagna promise to become the home of a busy, contented and happy people. Findlay thought that a certain mosquito might be a factor in the distribution of yellow fever, but this was demonstrated to be a fact only by the careful and heroic investigations of Reed and his colleagues. Small-pox was well-nigh universal until the careful observations and practical experiments of Jenner relieved man of the heavy tribute that he paid to this disease in death and disfigurement. Anthrax and hydrophobia levied a heavy tax on both man and beast until brought under man's control by the genius of Pasteur. Diphtheria with its death rate of from 50 to 60 per cent. alarmed the physician and awakened the horror of the community until the patient labors of Behring and Roux gave the world antitoxin. The beneficent action of anesthesia was foreshadowed by Davy and brought to full realization by the experiments of Long, Wells, Jackson and Morton. The true nature of tuberculosis was brought to light by the studies of Vilemin and Koch, and upon the knowledge thus gained it is within the power of man to stamp out this and other infectious diseases. A list of the great discoveries of scientific medicine is too long to give fully. This investigation into the causation and prevention of disease is not complete, it is barely begun. No disease that afflicts man or beast is thoroughly understood; in all cases the knowledge in the possession of the wisest medical man is but fragmentary, and in regard to the nature of many diseases we are still in complete ignorance. For instance, we know practically nothing as yet of the cause of cancer and but little of that of insanity. We are just beginning to practise vaccination against typhoid fever and other acute infections. The greatest problem that lies before the most advanced nations to-day is to free themselves from

disease, and this can be accomplished in only one way, and that is, the development and maintenance of medical research. This is a national and community problem, and that nation which does this most generously and most wisely will dominate the world, because it will become the strongest and the best. At present it must be admitted that Germany is in the lead, and the predominance of the German is due to his universities and the encouragement that he has given to scientific research. American medical research grows stronger year by year. There are numerous laboratories that are turning out most creditable work, but we need more of them and better equipment for those we have. The nation, the several states and the large cities can make no better investment than that given for the purpose of widening the knowledge necessary to keep the people in health. We may reasonably hope that the discoveries to be made in our laboratories will tend to decrease poverty, diminish sickness, prolong life, increase the effectiveness of the individual, add to the comfort and contentment of the people, and give to our country in the coming generations stronger and better men and women. A certain number of medical men of the future must give their lives to research work. However, this number will always be relatively small.

It is my intention to speak especially of the medical practitioner of the future. This individual's duties are to be quite different from those of the medical practitioner of the past, and if the world is to profit, as I hope it may, by the aid of medical science, the attitude of the profession toward the public and that of the public toward the profession must radically change. Heretofore the medical man has been taught from the beginning of his professional studies that he must not talk about professional matters to the laity. He has been made to feel that his duty is to practise and not to preach. To a certain extent this is wise and must hold for the future, as it has for the past. The practise of the profession, so far as the relations of physician and patient are concerned, is sacred and must not become matter for gossip. All understand this and no man worthy to be a member of the profession will for a moment forget or cease to hold sacred his relation to his patient. But the medical man of the future must become a public teacher, instructing his community and advising with those in authority concerning the good of the whole. In doing this he must use, in a proper manner, of course, the usual avenues of reaching the public, such as the popular magazine and the daily newspaper. Up to the present time the only instructor of the public in matters pertaining to disease has been the charlatan who has made extensive use of the daily press. This must be altered for the public good. The medical man must disseminate through this and other avenues the knowledge necessary to combat disease, and there has been nothing more encouraging in the attempt, just now begun, and of necessity led by the profession, to stamp out tuberculosis and to diminish the other infectious diseases than the readiness with which the newspapers of this country have taken up the matter. The national anti-tuberculosis society is sending twice a month material bearing on this subject to hundreds of newspapers, and they are making proper use of it. I know of no reputable newspaper that has declined to participate in this great work. The best and most accurate information concerning the prevention of disease must be diffused through the masses. The medical man of the future must talk and write on these subjects not exclusively for the benefit of

his fellows in the profession, but especially for those outside of it. Ignorance concerning these matters is appalling not only among the uneducated but among the educated as well. There are many teachers in our public schools, not only in the primary and secondary schools, but in our colleges and even in our universities as well, who are in absolute ignorance of the most elementary principles of hygiene. There are master architects planning our buildings, both public and private, who have no knowledge of ventilation. They may produce imposing elevations and design beautiful cornices and pleasing facades, but they are ignorant of the proper distribution of air and light. I predict that the time does not lie many generations in the future when many of the national, state and municipal buildings upon which the present looks with pride will be regarded as relics of a barbaric, at least a semi-barbaric, past. There are members on our public water commissions who could not distinguish between a typhoid bacillus and a yeast plant. As a rule, the men who enact our laws, both national and state, know nothing of that greatest asset that a people may have, which is health. Sometimes this amounts to a national calamity. I need only refer to the fact that when we last assembled a great army, within less than three months, and without seeing the enemy, nearly one fifth of those who enlisted were incapacitated by disease. This was due essentially to two things. First, Congress in its stupidity and ignorance had failed to make proper provision for the medical service. There was not a microscope in a camp in the United States army in 1898, so far as I know, until the necessity for its use was made evident by thousands of cases of typhoid fever, at first wrongly diagnosed as malaria—a mistake that could not have been made had the medical service been equipped as the then surgeon general wished it to be. But Congress would not listen to the man who was regarded by many of its members as only a scientific crank. In the second place, the line officer of that time, and no one appreciates his high average character more than I do, and I saw much of him, was too often deaf to his medical assistant and comrade. Shortly after the Japanese-Russian war I had occasion to compliment a high medical officer of the former nation on the low Japanese death rate from disease, when he replied: "We know nothing more about the hygiene of armies than you do. In fact, what we do know we learned from America and Europe, but our line officers accepted our advice so far as was possible."

Health is, as I have stated, a nation's best asset, and yet the sums devoted to maintaining the health of our people by the nation and by the several states are paltry in the extreme.

We need not worry about a low birth rate, but we should regard a high death rate as a national disgrace and a sign of national decay. As the race grows wiser and stronger in body and intellect these rates quite naturally approach the same level. This was made plain by Herbert Spencer more than fifty years ago. No nation that neglects the health of its people can hope to endure, and that government that secures for its citizens the longest average life in health is the best, whatever its tariff laws may be. These facts are being understood more or less thoroughly by some of the most advanced nations, and in doing this work the medical profession must lead the way. The medical educators of this country realize this much more fully than any one else can, and laying aside personal ambitions and especially pecuniary considerations, they are striving to prepare

for the next generation a profession made up of men of broad culture and of special scientific skill. This is the explanation of mergers in medical colleges, of the rapid advance in the requirements for admission to medical schools, and for the extension of the course. The medical man of the future must be a leader in all that pertains to the highest welfare of his country. His help is necessary in order to relieve the people from the bondage of disease.

Permit me to briefly point out some of the specific ways in which the medical profession can be of benefit to the people. The civilized world is awakening to the knowledge that the infectious diseases are preventable, the most enlightened of the nations are adopting measures to prevent them, and there is to be a healthy rivalry among the countries to see which can do this first and in the most effective manner. This is demonstrated by the crusade now being inaugurated against tuberculosis. We may reasonably expect improved methods in the treatment of this disease, and such knowledge as will give this to us must come as a result of the labors of scientific medical men. But the great effort must be made in its prevention, and this is, and will continue to be, a community problem, into which the nation, the state and the locality must throw their best and wisest efforts. Knowledge of the nature of the disease, its avenues of dissemination, and the means necessary for its restriction, must come into the possession of all classes and conditions, and the medical profession must be the source of this information. The practical application of this knowledge must be directed by the same body of men. The practitioner must recognize the disease in its incipient stages, before the infected individual becomes a possible center for the infection of others, and while the process in himself can be arrested. This will be demanded of every physician in the future, and the people must learn wisdom enough to go to the doctor before it is too late. Sanitoria and hospitals for the education and treatment of the infected must be provided by the public. This attempt to restrict and eradicate so grave and widespread a disease is the greatest and most beneficent undertaking that man has ever assumed, but it is not a visionary dream. It is a herculean task, but one not beyond the accomplishment of intelligence and effort.

Typhoid fever and other diseases, disseminated so frequently by contaminated water and milk, need not exist, and the heavy tribute that we pay annually to these infections is not complimentary to either our intelligence or our brotherly love, one for the other. The millions that we lose every year in deaths from these diseases would, if properly expended, soon place a safe water supply in every city and village.

It is time for us to stop attempting to control the venereal diseases by moral suasion. A false modesty has prevented us from talking about these distempers, and they should be added to the list of dangerous and communicable diseases, and every person found infected with one of them should be put in custody until he or she is free from the infection.

The time will come, if the world is to progress in intelligence, when every person will undergo a thorough examination at the hand of a skilful physician twice or oftener, each year. An official record of each such examination will be made, and no two consecutive examinations will be made by the same physician; and after death an autopsy will be made. Then the careless and unskilled physician will soon find himself without a vocation.

The world has never been in greater need of the enlightened medical man than it is

likely to be in the next generation, and the world will demand that he be worthy of the tasks that will fall upon him. No other profession will be able to render greater service to mankind. The incentive to enter the profession is not likely to be great, measured in the coin of the realm, but measured by the good done to the race, there will be none greater. The function of the new, combined medical department of the University of Cincinnati will be to prepare properly its students for worthy service in that profession which has always labored for the uplift of mankind.

A regular and frequent thorough physical examination of every citizen must be adopted by the people if the race is to be freed from disease. The good that can be accomplished by this is not limited to the infectious diseases. There are many disorders of metabolism which, if detected in time, may be arrested or cured. I will at present refer to only one of these. There are many men and women just passing the prime of life who are developing a glycosuria. At first this is in many instances a pathological condition that is easily controlled by a proper diet. Often it begins with a diminished capacity on the part of the individual to properly dispose of a few special carbohydrates. Which these are should be determined and eliminated from the daily food. In his ignorance the individual continues to eat the food which for him has become a poison. After some months or years the condition grows more grave. The person becomes incapable of properly metabolizing any carbohydrate and finally he can no longer utilize the carbohydrate group in his protein food. Having reached this point, the individual becomes cognizant of the fact that he is not well and he goes to his physician, but the condition is now incurable.

This is given simply as an illustration of the great good that an educated medical profession might render the public by constant supervision of the public health, but in order to bring this about both the profession and the public must be educated along scientific lines. It must be begun among the more intelligent, and its good results becoming apparent, it will be adopted by all. In Michigan University this work has been started. Every medical student must submit to a thorough physical examination each semester, and if any abnormality be detected, the individual must follow rules and regulations if he is to continue in the school. We hope in a few months to extend this to the students of all departments of the university. There is no better place to begin this beneficent work than in our institutions of higher learning. With us no student will be permitted to use the gymnasium until he is found by actual examination to be free from venereal disease, and any one attending the gymnasium may be called upon to submit himself to an examination at any time. Those having other physical defects will be placed under such restrictions as the medical men may impose.

The nation that will profit in the future from the labors and discoveries of the medical profession must help in this cause. It must make large appropriations for scientific research. It must render financial aid to medical education, which has become too costly for the profession itself to provide, and it must not permit of the use of short roads to practise. While the advanced medical educator in this country is doing his best to elevate his profession, pseudo-medicine is filling the lobbies of every state capitol with demands for legal recognition, and too often it happens that our law makers are not wise enough to distinguish between the true and the false. This imposes a heavy duty upon the profession, and

that is the one which I have already emphasized—the education of the public. To one who has had occasion to interview our legislators, both national and state, in behalf of public health affairs, the situation often becomes most depressing. The task seems hopeless and one is inclined to forego all effort. Men high in the councils of the nation say without hesitation that this talk about stamping out tuberculosis is only a doctor's fad. As one listens to such talk, as I have, from high sources, his national pride hides its face in shame and he wonders to what destination his country is drifting with such colossal ignorance guiding its course. But, as medical educators our duty is clear, and it has fallen to us to prepare the next generation of those who will be able to render a far greater service to human progress than the world has yet seen. With the race freed from disease, both inherited and acquired, the better man will be born and will dominate the earth. I am not enough of a prophet to predict anything concerning the nationality of the superman who is to come and possess the earth, but he will not come to a disease-ridden people, for the intellectuality and morality of a nation depend upon its physical health, and the historian of the future will have no difficulty in convincing his readers that we who lived in the early part of the twentieth century were not so wise as we believed ourselves to be, as he points out our high mortality rate from preventable diseases, and shows what feeble efforts were made to prevent them.

VICTOR C. VAUGHAN

THE NUMBER OF STUDENTS IN GERMAN UNIVERSITIES

SOME statistics regarding the number of students in the twenty-one German universities, which have lately appeared in the *Frankfurter Zeitung,* may be of interest to the readers of SCIENCE.

The number of students matriculated in the summer semester of 1909 reached the total of 51,510, as compared with 48,717 in the winter of 1908–09, and 47,799 in the preceding summer.

In thirty years the increase has been as follows:

Year	No. of Students	Per 100,000 Population
1879	19,771	43.7
1889	29,491	——
1899	33,563	——
1909	51,510	78.4

The relative increase in the principal subdivisions may be shown in the following table:

	Number		Per 100,000 Population	
	1879	1909	1879	1909
Philological and historical studies ..	2,724	7,690	10.6	20.6
Mathematics and natural science ..	1,563	3,503	6.1	9.4
Law	3,179	7,259	12.3	19.5
Medicine	2,061	4,879	8.0	13.1
Theology (evangelical)	1,036	1,211	5.9	5.6
Theology (catholic)	330	1,014	3.5	8.4
Pharmacy	301	896	1.2	2.4

It will be noted that the percentage increase in medicine has about kept pace with the increase in law, while the proportion of students in mathematics and natural science has not increased so rapidly as that in philological and historical studies. The number of students of evangelical theology shows a relative falling off (although a slight absolute increase), but catholic theology records a greater relative increase than any other subject.

Some interesting facts are also given respecting the extent and nature of inter-university migration. In the summer months of 1909, 28.6 per cent. of the Prussian students were registered in the German universities outside of Prussia, for the most part (18.7 per cent.) in the South German universities of Bavaria, Baden (Heidelberg and Freiburg) and Württemberg (Tübingen). On the other hand, only 5.8 per cent. of the Bavarian, 8.4 per cent. of the Baden and 10.7 per cent. of