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An Address
ON
MEDICAL EDUCATION AND LICENSURE IN THE UNITED STATES OF AMERICA.*

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My acquaintance with American medical education goes back a long way. When, after graduating in 1884, I proceeded to Vienna for post-graduate study, I made the acquaintance of quite a number of the 250 American graduates who were then studying there. There were 50 graduates of British schools, and it would be incorrect to say that we formed a high opinion of medical education in America from contact with some American colleagues in the practical classes. After five years, spent partly as a resident physician, and partly in general practice in Cumberland, I had, in 1890, my first opportunity of visiting the States, when I accompanied my father on a three months' tour. We landed in New York, made our way slowly across country to San Francisco by one route, and returned by another to Quebec, where we embarked for home. My father's interests were, of course, in the theological colleges, and, while he visited Princeton and Yale, I devoted much of my time to the medical schools in Boston, New York, Baltimore, Philadelphia, Chicago, Sioux City, Denver, San Francisco, Toronto, and Montreal. I look back over long years with a very lively sense of appreciation of the kindness of our American colleagues to a young man still well under 30. I made many friendships, most of them, alas! now broken by death. The closest was with Osler, whose guest I was in Baltimore, and with whom I maintained cordial relations to the end. It is something of a memory to me that it was to my ward that Osler paid his last visit to any hospital, less than a week before his death. Then, in 1906, when the British Medical Association held its Annual Meeting in Toronto, I again crossed the Atlantic, and, on the way home, spent a few days with my friend James C. Johnstone in New York, and got a pretty thorough insight into the workings of Cornell. My next visit was in 1920, when, on the invitation of the Carnegie Foundation, I accompanied Sir Humphry Rolleston, Sir Holburt Waring, and Drs. Des Maret and Roussy on a real American tour (of three weeks' duration) of selected universities in New York, Washington, New Orleans, St. Louis, Minneapolis, Chicago, Cleveland, Cincinnati, Ann Arbor, Boston, Philadelphia, and Baltimore. In spring of last year, on the invitation of the Council of Medical Education and Hospitals, a branch of the American Medical Association, I attended their annual conference, and took part in their debates. I may thus claim, I think, to have had rather exceptional opportunities of observing the development of medical education over more than forty years, and, being thoroughly convinced of the importance of the two great English-speaking nations understanding each other better, I feel it my duty to do what little I can to help towards this end. I accept to the full the following quotation from the *Chicago Daily News* (March, 1929): "Good relations between England and the U.S.A. depend on an informed, an impartial, and a critical public opinion."

BEGINNINGS OF MEDICINE IN THE U.S.A.

It is not possible to realize the present situation without knowing something of the development of medicine in the United States, and I am much indebted to an article by Professor Waite of Western Reserve University, Cleveland, on "The beginnings of medicine in the United States," for the material on which to frame this brief sketch.

The earliest doctors in the States, of course, had their education in Europe, and were graduates of well-known universities, but, as the supply of them was insufficient, the apprenticeship system, then in vogue in this country, was soon introduced. The apprentice was usually bound for seven years, on the mutual understanding that he was to serve his master, and his master was to teach him. When he had served his apprenticeship his teacher gave him a certificate of service and proficiency. This could be registered in a Court of Record, and its owner then became a legally qualified practitioner. Judgement of the proficiency of the apprentices rested solely with the teachers, and, so long as these latter were educated, competent, and appreciated their responsibility, the method worked well enough. Until 1765 there were no medical schools in the Colonies, and, as the number of qualified medical men immigrating bore less and less proportion to the population, the proportion of the apprentice type of doctor increased. Many of these had little proficiency either as scholars or teachers, and the training through apprenticeship steadily deteriorated. The seven-year term was shortened, and the quality of the training depreciated. "By the middle of the eighteenth century American medicine was decadent, a fact which was strikingly apparent in the medical service of the French and Indian war" (Waite). As early as 1735 medical societies began to appear, but these were local and transitory. In 1766 a State Medical Society was organized in New Jersey, and, in 1772, legislation was secured requiring examination and licensure by two judges of the Supreme Court, "with such assistance as they might call." In 1781 the Massachusetts Medical Society was incorporated; its charter empowered it "to examine all candidates for the practice of Physic and Surgery . . . respecting their skill in their profession . . . if found skilled in their profession, and fitted for the practice of it, they shall receive the approbation of the

* Delivered in Glasgow (Sir Donald MacAlister in the chair) and in Aberdeen (Professor Low, Dean of the Faculty of Medicine, in the chair).

Society in letters testimonial." The first licence was granted in 1782, the year in which Harvard Medical School was founded. Only the pupils of Fellows and Honorary Members of the Society were admitted to examination, and, in 1789, three years was prescribed as the minimum period of study, and there were enumerated among the studies necessary: Greek, Latin, the principles of geometry, and experimental philosophy. Other New England States followed, and an interesting feature of many of their charters was that they were obliged to describe and point out "such medical instruction or education as they shall judge requisite for the practice of physic and surgery." In other words, they laid down a course of study.

These State societies were, in a way, not unlike the chartered bodies of this country—the Colleges of Physicians and Surgeons, and the Society of Apothecaries. Like the colleges, they were particular about the persons whom they appointed to their governing boards, and they were equally particular about the qualifications of the candidates. They "vetted" the preceptors, and often refused to examine a candidate whose master was not, in their judgement, competent. This delegation of licensure to medical societies was extended and subdivided, so that, in some States, the licence was usually only valid within the political subdivision represented. When a licensee went elsewhere he had to procure a new licence.

About 1825 homoeopathy and other sects began to appear; these formed their own medical societies, and, in some States, secured licensing privileges. In their zeal for propaganda it was charged that they lessened the requirements as to length of study under a preceptor, and were content with subscription to the tenets of their sect. The existence of these multiple sectarian medical societies aroused anxiety in the public mind, and, about 1835, legislation began to appear, taking the function of licensure away from the medical societies and placing it under a State Board of Medical Examiners appointed by the Governor. In some States the Governor's choice was restricted to a list of nominations by the medical societies. In many States the statutes stipulated that the Board should contain representatives of each of the several sects, but that no one sect should be in the majority. In their early days the State Boards accepted university degrees as sufficient grounds for licence, but the apprentices were examined; indeed, in comparatively recent years a few States admitted to their State Board examinations almost anybody. But the degree of M.D. was generally the accepted condition, and a definite commercial value came to be associated with it. And so things went on. In many centres the seriousness of the position was recognized, and excellent work was done in the endeavour to improve matters. But the time was not ripe; the necessity for reform had not yet been appreciated by either the public or the profession—things had got to get worse before they got better.

About 1880 came the orgy of organization of proprietary medical schools. In that year there were about 100 so-called medical schools. In 1890 there were 133, in 1900 there were 160, and the peak figure of 166 was reached in 1904. As at this date there were in the rest of the world 174, 47.5 of the total was obviously over-adequate, even for America.

It would be unfair to suggest that all the small medical schools were commercial undertakings. Not a few of them were bona-fide efforts of groups of doctors eager to do their share in the matter of medical education. But their means were insufficient; they could not equip laboratories as they needed to be equipped; they lacked, some of them, any hospital opportunities, and many of them, to their credit, committed suicide in the general interest.

These schools had apparently no difficulty in procuring State charters of incorporation. It is not an easy matter, in this country, to obtain a charter for the foundation of a university, but in those days, in America, the procedure seems to have been simplicity itself. Any State could, and apparently did, grant a charter to almost any group of applicants. There was no supervision of medical studies, and some of the chartered medical schools granted the degree of M.D. after a ludicrously short curriculum. Two sessions could be put into one year. But we must not be too superior. We did the same thing in my student days, when two summer sessions counted for a winter one, and the nominal four years could be done in a little over three years. Under these conditions an amazing number of schools were established. There are records of no fewer than 447, but fortunately they did not all exist at one time, and the careers of many were very brief. As an instance that it is still easy to procure a charter, I take these facts from an official publication of the American Medical Association, February 15th, 1928: "The American Medical University is the successor of the Kansas City College, which was shown to be involved in a diploma mill scandal 1923–25, and its charter was revoked on June 23rd, 1926. The successor got a new charter, and started on its new career on August 9th, 1926."

It then became necessary to repeat the procedure of a century earlier, when medical societies were forced to examine the certified pupils of careless and incompetent preceptors, as a precaution against inefficient training. In the last decades of the nineteenth century, as a precaution against the inefficiency of weak schools, all medical school graduates, as well as those educated under preceptors, were compelled to take the examinations of the State Board of Licensure, and automatic licensure on the diploma was terminated.

The examination of the State Boards was a formidable thing, on paper. It comprised all the subjects of the medical curriculum, and involved some three days spent in answering written papers on these, and was therefore, theoretically, a very severe ordeal. There was no clinical examination. A, to us, curious regulation provided that no examiner on a State Board should be a teacher. The object of this regulation was to prevent a professor in a proprietary school deriving pecuniary advantage from his position of examiner. It is necessary at this stage, in order to make the position clear, to point out the root differences between American methods and ours.

In this country there are twenty-three licensing bodies, whose degrees or diplomas confer on their holder the right of entry to the *Medical Register*. These twenty-three bodies carry out their work under the supervision of the General Medical Council, whose duty it is to certify to the Privy Council that the degrees and diplomas issued are conferred after a course of study and examinations which ensure that their holders have a "sufficient" knowledge of medicine, surgery, and midwifery to enable them to practise medicine "efficiently." The Council gathers the information to enable it to pronounce on the efficiency of the study and examinations by requiring regular returns from all the bodies annually, and by an organized system of inspection and visitation, which is more or less continuously going on. In case of misunderstanding on the other side, it is advisable to be a little more explicit. Of the twenty-three licensing bodies, eight—the three Colleges of Physicians, the Colleges of Surgeons of England and Edinburgh, the Faculty of Physicians and Surgeons of Glasgow, and the Society of Apothecaries and the Apothecaries' Hall, Dublin—are only examining bodies, and do not officially control schools of medicine. The Royal College of Surgeons in Ireland does. On the other hand, there fall to be added the twelve medical schools attached to London hospitals, the three extramural schools in Edinburgh and Glasgow, University College, Dundee (St. Andrews University), and the University Colleges of Cork and Galway (National University), making a total of thirty-three medical schools. As the population of the two countries is about 2.6 to 1, we seem to be almost equally supplied with medical schools.

In the United States quite another system is in operation. There are to-day eighty medical colleges (ten of these only give the first two years of instruction) in the U.S.A., and the degree of none of them carries with it any right to practise or of admission to any official medical register. There is no General Medical Council, and the laws regulating medical practice may vary from State to State. The doctrine of State rights requires every State to lay down its own conditions and regulations for the practice of medicine (or the healing art). Each State has at least one medical licensing board, and, in theory, everyone who wishes to practise in the State must pass its

examination. You will notice that I said at least one medical board, and here lies one of the great differences in medical practice in the two countries. In this country there is no prohibition of medical practice by the unqualified, though there is in the branches of midwifery, dentistry, and venereal diseases. In all the United States there are strict laws prohibiting practice by those who are not somehow officially licensed. There are some who wish we had similar laws in this country, and at one time I was disposed to share that view. A larger experience has shaken that disposition. If, in this country, any crank wishes to practise his own theories, he is free to do so at his own risk, and those who employ him do so at theirs. All the law does is to provide a list—the *Medical Register*—of those who are qualified practitioners. And yet I do not believe there is any country in the world which contains a less proportion of irregular practitioners than ours.

Let us see how the other plan works; I take for the purpose the State of Connecticut, an old-established Eastern State. My information is that there are at least six (probably seven) separate boards of examiners whose licence enables the individual to practise medicine in some form. The Regular (formerly incorrectly called Allopath) Board, the Homoeopathic Board, the Eclectic Board, the Osteopathic Board, and separate boards for chiropractic, naturopathy, and drugless healing. It is to be noted that the only branch of medicine—if one may call it so—which can be practised by anyone, anywhere, without any licence, is Christian Science. Each licensee must, in theory, restrict himself to the methods of his sect—for example, a drugless healer who is proved to have made use of any active drug is liable to fine or imprisonment. The index to the *Bulletin* of the Federation of State Boards contains pages of records of such convictions.

I have it on excellent authority that it may be taken that, throughout the States generally, there is one such irregular practitioner to every five regular ones. The education of many of the irregular practitioners leaves much to be desired, and several States, concerned about the situation, have endeavoured to correct it by the introduction of what is called a Basic Science Law, which requires every applicant who desires to practise any branch of the "healing art" to pass an examination in anatomy, physiology, pathology, bacteriology, and diagnosis, after satisfying the Basic Science Board that they have had an education of some sort in these subjects; physics, chemistry, and biology are not covered by the requirements of the examination. Pharmacology is never included, because of homoeopathic, chiropractic, drugless healing, and other such doctrines. The aim of the Basic Science Law is to ensure some common standard of knowledge of the underlying medical sciences, common to all branches of the healing art, and they are proposed mostly for States which have several boards of examiners. They are also intended to keep hopelessly irregular practitioners out.

The Basic Science Laws are not looked on with favour by the earnest medical reformers; they give permanent and legal recognition to sub-standard cults, and they impose an undue extra burden on the graduates of Class A schools, who have already passed their examinations in these subjects, and who form 96 per cent. of the successful candidates at State Board examinations. They tend to wreck the working system of reciprocity which existed between many States, and it is a little curious that the free trade—using the word in its ordinary sense—which exists between all the States of the Union, and makes them the largest free trade area in the world, is conspicuously absent in medicine.

It is, however, interesting to learn that the number of cult schools grows steadily less. This is shown in the following table, which gives the numbers of certain such schools in 1920 and 1927 respectively.

	In 1920.	In 1927.
Schools of osteopathy	13	8
Schools of chiropractic	79	40
Schools of naturopathy	20	12

The number of students in the schools of chiropractic has declined notably in the last five or six years.

The Federation of State Boards has recently performed a remarkably courageous action: the Board has done admirable service in the past by prescribing a rather cast-iron curriculum, which has served its day and generation. In the spring of this year it decided to discontinue prescription of a curriculum, and to turn the responsibility of this over to the medical schools, to whom it properly belongs. The standard will be under the direction of the Association of American Medical Colleges, all the members of which are Class A schools.

Early in this century there came a stirring. It is not for me to distribute bouquets; obviously, many minds were thinking in the same direction, and the movement was general. The active spirits of the American Medical Association, of the Association of American Medical Colleges, and of the Federation of State Medical Boards were all thinking hard, and seeking a solution of their problems. They were sapping and mining for an advance.

REFORM.

In 1907 the Council of Medical Education of the American Medical Association made its first official inspection of all the (then 160) medical schools in the U.S.A. The report presented in that year is very interesting reading. It was made by Dr. A. Dean Bevan, and the contrast between it and the corresponding report which I had the pleasure of hearing from the lips of the same man in February, 1928, was quite arresting. It is not given to many reformers to see their labours so fruitfully fulfilled. Dr. Bevan has this year resigned the post, and passed on his chairmanship to Dr. Ray Lyman Wilbur, president of Stanford University. That the choice is a good one is surely emphasized by the fact that President Hoover has appointed Dr. Wilbur Secretary of the Interior in his Cabinet. The Council has been further fortunate in having had as its secretary since 1907 Dr. N. P. Colwell, who can and does answer any question on medical education in the States by return of post or by telegram. A third to whom I am likewise much indebted is Dr. Walter L. Bierring, Hon. M.R.C.P.Ed., who has filled, during all these strenuous years, the important positions of secretary and treasurer of the Federation of State Boards, and editor of the Federation *Bulletin*. It gives me great pleasure to have this opportunity of publicly expressing my indebtedness to these friends.

Continuing my metaphor, it may, I think, justly be said that the blasting powder and the detonator were supplied by Flexner's famous report—*Bulletin* No. 4 of the Carnegie Foundation for the Advancement of Teaching, published in 1910. It gave a mercilessly candid report of the condition of the 140 medical schools then existing in the U.S.A., of which the following will serve as a sample:

"*Entrance Requirement:* Nominal.

"*Attendance:* 9, of which 7 are from x.

"*Teaching Staff:* 27, of whom 26 are professors.

"*Resources Available for Maintenance:* Fees amounting to 1,060 dollars (estimated). £210.

"*Laboratory Facilities:* The School occupies a few neglected rooms on the second floor of a fifty-foot frame building. Its so-called equipment is dirty and disorderly beyond description. Its outfit in Anatomy consists of a small box of bones, and the dried-up fragments of a single cadaver. A few bottles of reagents constitute the Chemical Laboratory. A cold and rusty incubator, a single microscope, and a few unlabelled wet specimens, etc., form the so-called equipment for Pathology and Bacteriology.

"*Clinical Facilities:* There is no dispensary and no access to the County Hospital.

"The School is a disgrace to the State whose laws permit its existence."

And yet the degree conferred was legally as useful as that of Harvard.

GRADING.

The American Medical Association.

It is difficult for us, used for seventy years to our own statutory General Council of Medical Education and Registration, to realize all that has been done in the U.S.A. by a purely voluntary association. It could not have been done in this country. Now and again, with us, a daring journalist publishes statements which he knows may be the subject of legal proceedings. The American Medical Association seems to be doing this all the time, and one can only surmise that the laws of libel in our two

countries are not the same. Listen to this from a speech by Dr. Bevan:

"I remember as well as though it were yesterday, although it was twenty-two years ago, that, when I presented these tables, I said: 'It is evident from a study of the medical schools of this country, and their work, that there are four especially rotten spots which are responsible for most of the bad medical instruction. They are: Illinois with fifteen medical schools, Maryland with eight medical schools, Kentucky with seven medical schools, Tennessee with ten medical schools.'"

In 1906 the American Medical Association took the matter seriously in hand, and in 1907 issued its first list of the existing 160 medical schools, graded alphabetically.

The method of grading took into consideration the following ten points:

1. Showing of graduates before State Board examinations.
2. Requirements and enforcement of satisfactory preliminary education.
3. Character and extent of college curriculum.
4. Medical school buildings.
5. Laboratory facilities and instruction.
6. Dispensary facilities and instruction.
7. Hospital facilities and instruction.
8. Extent to which the first two years are officered by men devoting entire time to teaching, and evidences of original research work.
9. Extent to which the school is conducted for the profit of the Faculty, directly or indirectly, rather than teaching.
10. Libraries, museums, charts, etc.

For each of these ten marks were allotted.

Class A schools, "in good standing," comprised those whose marks were 90–100; Class B, 80–90; C, 70–80; D and E, 50–70; and F, 50 and below.

Classes A, B, and C, totalling 81, obtained over 70 per cent., and were recommended to the State Boards as being "up to standard." Classes D and E, totalling 47, were informed that certain improvements might bring them up to the 70 mark. Class F (32) was apparently beyond redemption. The effects were soon apparent. In 1910 the numbers had dropped from 162 to 131, in 1915 to 96, in 1920 to 85, and in 1925 to 80, at which the figure remains to-day. In 1913 there were graduates from Class A schools numbering 2,539, from Class B schools numbering 1,050, and from Class C schools numbering 392. In 1927 the corresponding figures were 3,798, 117, and 120; and in 1928 they were 4,091, 96, and 75. There are now seventy-two schools in Class A, three in Class B, and five in Class C, but these last are no longer given general recognition by the American Medical Association.

The Council of Medical Education and Hospitals appoints inspectors to "visit" each of these schools, and, on their report, grades the schools annually. A Class A school may, for example, be warned that, unless this or that improvement is made in its arrangements before the next inspection, it will be put in Class B, while a Class B school may be given the hope that, if certain improvements are made, it may mean promotion. The system works very smoothly, and degradation is, to-day, rare.

Before I leave the subject of inspection, the following quotation from Dr. Bevan's address, which I had the pleasure of listening to in February last in Chicago, will be of interest, as showing the spirit in which inspection is offered and taken.

"When we began our first inspection there were seven medical colleges in Louisville, Ky. I received a letter from one of my good friends in Louisville one day, telling me not to come to Louisville, because all the medical schools had agreed not to allow themselves to be inspected by the Council. I wired at once that Dr. Colwell and I were leaving for Louisville that night, and desired to inspect the schools the next day. With true Southern hospitality, they received us, and gave us every opportunity to inspect their schools. They gave us a luncheon at the Pendennis Club. We discussed the subject of consolidating all the medical schools in Louisville into one strong school, which might then secure the united support of the medical profession and the citizens of Louisville, and secure the use of the Louisville Hospital as a hospital for teaching and research; this was finally agreed to and finally carried into effect, so that, to-day, Louisville has a single school much stronger than any of its predecessors, and enjoys the benefit of excellent clinical material. The same story was repeated in many cities of the country."

I think you will agree that the following quotation from an address delivered in October, 1928, by William Lowe Bryan, president of Indiana University, is more trenchant than my modest criticisms.

"An extreme illustration of this, as you know, is to be found in the history of medical education within the past twenty-five years. Something more than twenty-five years ago you saw scores of fraudulent schools, and other scores of schools unforgivably weak, and unable to give proper training for medical practice. You saw the central duty of bringing medical science at its best to the people through rightly trained physicians. You went to war. You inspected schools with relentless thoroughness. You published the worst you found there without mercy. You agreed upon ironclad prescriptions. And then you made lists. The lists did the work. Your black list killed the weak and the fraudulent schools by the score. Within an astonishingly short time you have wrought a revolution in medical education in America, great, and, as we believe, necessary and inevitable."

American educational methods differ so much from ours that it is well to give a brief account of them. There seems to be a general opinion that, take it all round, our primary and secondary school education is rather better than that of the United States; whether, as some assert, this is influenced by the lesser proportion of male teachers in America must be a matter of opinion. The same system of inspection and grading by bodies, not all of which have official authority, extends to the schools, and only candidates from "approved" schools are accepted by the colleges. The requirements of the medical schools have steadily risen. Only a few years ago one year of "college" training sufficed for entry to Grade A medical schools, but for long there had been a movement towards a wider general education. Johns Hopkins began as far back as 1893. Its directors gripped the principle that an adequate general education was the only sure foundation for a sound medical education, and they limited their admissions to those candidates who had had two years of college education. Harvard followed in 1900, Western Reserve in 1901, Rush in 1904, and California in 1905. Then the rate quickened up, and now a two years' college course is a condition of entry to all Class A schools, while a three years' college course, which usually means a degree in arts or science, is a condition of entrance to fourteen medical schools. One of them requires four. This takes our thoughts back to the days when many Scottish students took the old three or four years' course for the M.A. before commencing to study medicine.

At college the student studies biology, chemistry, physics, English, another language (French or German), and mathematics. Some colleges include psychology and sociology in the course.

The next thing a student has to do is to gain admission to a medical school. Most of the American schools now limit their entry to the number that they are satisfied they can efficiently teach. For example, the Western Reserve (Cleveland) medical school had more than a thousand applications in 1927; only 122 were accepted. Of these, 55 held either the B.A. or B.Sc. degree, and one was a Ph.D.

Some staggering figures are given as to the number of applicants, but, like all statistics, these have to be carefully analysed. Knowing the difficulties of gaining admission, the astute applicant does not confine his application to one school. It is apparently common to apply to five or six; one applicant is reported to have put in forty applications—all unsuccessful! This difficulty of admission makes some anxious lest the supply of doctors should become insufficient; but when the figures are analysed—and analysis of figures is a strong point in America—it is seen that the number of rejections is not so very serious. In the academic year 1927–28 23,590 applications were received by the eighty medical schools. Lest you should find this statement incredible, I hasten to add that these applications were made by only 11,282 individuals. Of these, in round figures, 6,500 were accepted (96 per cent. by Class A schools) and 4,500 refused. As some were accepted by more than one of the schools to which they had applied, the actual number of students commencing the study of medicine was materially less than the acceptance figure of 6,500. In 1928–29 the figures were: applications 29,166, applicants 12,537, accepted 7,014, refused 5,523. In 1928 there were 1,363 students registered in England,

Scotland, and Ireland. A table appended to the report of the Education Committee of the General Medical Council for 1928 shows that about a quarter of the practitioners registered in 1927 had not been registered as students, and, assuming a similar proportion of our existing students are not registered, we should arrive at a figure of nearly 1,700. There are, therefore, three and three-quarter times as many entrants in the United States as in this country, and the population is roughly 2.6 to 1.

Having obtained admission to the medical department of a university, the student, under the name of "Freshman," commences the study of medicine proper with anatomy and physiology. As a "Sophomore" he continues these studies in his second year, and, in addition, commences the study of bacteriology, pathology, and pharmacology—the laboratory subjects. It is the general rule that, during these two years, the student does no clinical work, but a tendency (described as infiltration) to introduce this earlier is growing, and short courses, very well organized, are established to relate these fundamental subjects to medicine and surgery. Other schools are extending the laboratory courses into the third and fourth years. Some regard the early approach to clinical work with misgiving. "It is becoming more difficult to secure instructors who have the proper idea as to medical education. Many do not appreciate the relative importance of their special subjects, nor the reasons why these have been included in the curriculum."

In his third year, under the designation of "Junior," the student usually begins clinical work, and this and the next year are devoted to a very highly organized—possibly too highly organized—scheme of study.

Here I digress to say something about the examination system of the American universities. Our students might receive, at first with jubilation, the news that there are in America no professional examinations like ours, where a stranger sits on the other side of the table with their professor, and there is even a chance of a "visitor" from the General Medical Council dropping in to listen. But let them not be too envious. Americans aim at something quite different from our system: an elaborate system of card indexing keeps the student's work constantly under the eye of his teacher; class examinations are frequent, and a final or terminal examination is held by the professor and his staff at the end of each year. Not much patience is shown with the slacker, and there are no "chronics" in up-to-date American universities. If a student's work has not been satisfactory he receives a warning, and if his work in the subsequent term does not show marked improvement he is "honourably dismissed." In the old days, when there were 160 odd schools available, this was perhaps not a very serious matter, as he could go to another school. But now that nearly all the schools are Grade A, and all practise this same plan, and as the intercommunication between universities regarding students is carried to the "*n*th" degree, it has become a very serious matter to be dismissed. There is some apprehension lest a few of those students who have recently applied for admission to British universities may be of this category.

The examinations are thus intra-university affairs, and the system of having an external examiner, which is general in this country, is not in evidence in the United States. One reason for this is that a degree carries with it no right of registration, as we call it in this country, or licensure, as it is called in the States. The candidate who desires to practise in a particular State has to make application to the State Medical Board, the only body which can give him the right to practise. These make their own conditions, and there is a growing tendency—a rapidly growing tendency—to require that each applicant for admission to the State examination must have not only a degree from an approved university, but evidence of having served for one year as an "intern." The "intern" year is an interesting recent development in American medical education. The credit for introducing it belongs to the State of Pennsylvania, whose State Medical Board made it a condition of licence in 1909. The University of Minnesota made it a condition of graduation in 1910. Eleven colleges now require it before they confer their degree, and fourteen States make it a condition of licensure.

We are, of course, familiar with the fact that most of our graduates realize the value of a period of residence in a hospital, and the competition for these posts is keen. But it is commonly urged that it would be impossible to introduce the American plan in this country owing to the relatively small number of such posts. Similar arguments were, I have no doubt, advanced in America, but the experiment was made, and it is now recorded that, of the graduates of last year, about 95 per cent. had held posts as "interns." It is not only that there is a large number of hospitals in America, but they, too, fall under the grading system. A special committee of the American Medical Association grades the hospitals, and as one of the conditions required for the upper grades is that there must be a definite proportion of "interns," this apparent difficulty melts away. The post is not quite the same as that of our house-physicians or surgeons, but generally that of an assistant house-physician or surgeon, or a resident clinical clerk, while some universities accept a year's work in a laboratory as equivalent. That there is room in this country for more residents, and, not least, in our smaller hospitals, hardly requires argument, and I for one should like to see the benefit reaped by the American hospitals, and the American public, who are thereby provided with better trained doctors, extended in this country. Adding all these requirements together, it will be seen that the average American doctor has to go through a seven years' curriculum: two in a college doing the pre-medical subjects, four in a medical school, and one as a resident in a hospital. It is little wonder that his age on graduation is about 27.

This prolonged curriculum is giving rise to some apprehension that it may discourage suitable candidates from studying medicine, and there is considerable uneasiness lest the desire to improve medical education should lead in a direction which may not be in the public interest. There are apprehensions that the improved and prolonged education now demanded may bring the supply of doctors below the public demand for medical service—especially in rural areas. It is true that, in the States, as in other industrial countries, the move from country to town affects also the doctors, and that many villages, which used to have a resident doctor, no longer have one. But there are compensations: the telephone, the motor car, and the excellent roads so increasingly numerous, bring doctor and patient nearer together; ten miles in a buggy is much more than twenty-five miles in a car, and the telephone, by taking the place of the messenger, cuts a big slice off the time the doctor takes to reach the patient. And if, added to these advantages, the doctor is more capable, better trained than his predecessor, surely the advantages of the changes outweigh the disadvantages. This uneasiness is voiced by one of the best known and most respected of American teachers, William J. Mayo, who, in an article entitled "The aim and ideals of the American Medical Association" (*Proceedings of the Mayo Clinic*, July 11th, 1928), directs attention to the fact that the average age of graduation in medicine in the U.S.A. is around twenty-seven years, and that consequently many bright men are being drawn into other professions. He makes some flattering comparisons with the graduates of Edinburgh, where the average age at graduation is about three years less, and he makes two suggestions which I give in his own words:

> "I do not advocate a letting down of standards in our medical schools, but I am convinced that one year of time could be saved in our grammar schools, and a year could be saved in our medical schools by the Four Quarter System. That children in the growing age have three months' vacation in the summer is no reason that young men and women, at the height of their physical vigour, in a world on a twelve-months' working basis, should have three months' vacation."

Under the Four Quarter System the work of any three consecutive quarters constitutes a college year. This would not be permissible under the laws of seventeen States, including New York and Pennsylvania, but the opinion is expressed in the *Federation Bulletin* that, eventually, all

State laws may be so modified as to permit medical students to save this year of valuable time, if they are physically and educationally fit to do so. This is surely significant of a trend in this direction.

In some schools classes go on continuously, a procedure which is facilitated by the very large staffs attached to all the departments. A student can thus put in the requisite number of terms in three years. It is not a method which commends itself to me. I do think, and I have often said, that the holidays which our senior students get are too long, but to expect a man to work at high pressure for three years, with only a month off in each, seems a severe tax on his physique, mental and bodily. Further, I think all experienced teachers will agree that the longer the period over which a subject is studied, the more likely is it to make a lasting mark upon the student's mind. I think, however, we might very well consider the American plan, in so far as it makes teaching, and particularly hospital teaching, available all the year round. It seems to an outsider that it is the strictness of entry, an excellent thing in many ways, which is responsible for the length of the American curriculum. The most recent modification of the Four Quarter System is more merciful. Under it each calendar year is divided into four terms of eleven weeks each, thus leaving eight weeks in the year for vacation.

The National Board.

Even the most superficial student of American politics must make himself acquainted with the democratic doctrine of State rights. In certain matters—and the practice of medicine is one of these—every State is a sovereign authority, and can make any laws it likes. For example: a practitioner licensed to practise in New York is acting illegally if he practises (without a New Jersey licence) in New Jersey, just across the river, and so all over the country. A would-be practitioner must be licensed by the Board of the State in which he wishes to practise.

The drawbacks were recognized and deplored, but the very idea of Federal interference is abhorrent to the State right diehard. Between some States there was established a plan of reciprocity under which each recognized the other's licence; but there was no general arrangement, and some States sternly maintained that it was the duty of each State to satisfy *itself* of the fitness of a medical practitioner to treat *its citizens*. And I have described to you the pretty job they made of it. As the population of the States grew, as communications multiplied, and as the American is more migratory in his habits than any other race, the inconveniences were more and more realized, but the solution was long delayed for America. In 1915 the late Dr. W. L. Rodman of Philadelphia, then President of the American Medical Association, launched the movement which culminated in the establishment of "The National Board of Medical Examiners of the United States," one of the most interesting recent developments in connexion with medicine in the States. The fact that the State Board examinations only give practice rights within their own boundaries, the fact that teachers of any medical subject were specifically excluded from membership of the examining boards, and the fact that candidates were examined (in perhaps three days) in every branch of medicine, directed the attention of those who were looking for improvements to a possible better way. The Board began its operations in 1916 with the purpose of establishing "a standard, qualifying examination, which could be safely accepted by all State Boards of Medical Licensure as an adequate qualification." It was chartered in 1922, under the laws of the District of Columbia. It is an unofficial body, and yet has a semi-official aspect, for the Surgeons-General of the three public services—Public Health, Army, and Navy—not only are members, but each carries with him to the Board an assessor. Among the other fifteen members of the Board, who are chosen by a method of co-option, there are at present two professors of medicine, two of surgery, and two of obstetrics, and one each of biological chemistry, physiology, and pathology. The remaining members are connected either with a university or with the Federation of State Medical Boards.

When Sir Humphry Rolleston, Sir Holburt Waring, and I visited this examination in Philadelphia in 1920, the old traditions of the State Licensing Board examination still lingered, and candidates were examined, in less than a week, in all the subjects of the medical curriculum. Partly, we like to think, owing to our friendly criticism, a better method now exists. The student who has successfully completed the first two years of work in a Class A medical school may then sit for Part 1 of the examination, which includes anatomy, physiology, physiological chemistry, general pathology, bacteriology, and materia medica and pharmacology. Part 2 of the examination, which consists of medicine, surgery, obstetrics, and medical jurisprudence, is taken at the end of the fourth year; and Part 3, clinical medicine and its branches, clinical surgery and its branches, obstetrics and gynaecology, and public health, is taken after the candidate has rendered satisfactory service as "intern" for one year in an accepted hospital or laboratory. The Board holds examinations for Parts 1 and 2 simultaneously in all Class A schools of the United States, provided five candidates are forthcoming, and the examination in Part 3 is held in eighteen different medical centres, so selected as to be reasonably accessible to all candidates. The figure laid down as the pass mark in these examinations is, to our ideas, placed fantastically high at 75 per cent. of the marks of each part of the examination, and a mark below 60 per cent. in any one subject involves failure. Having had the good fortune to be present on one occasion when the marks were considered, I can testify to the care with which they are estimated. And every examiner knows that it does not matter very much what numerical figure is put on the pass mark.

The fees for admission to the examinations seem to be based on Old rather than on New World standards: the registration fee is $5, the fee for Part 1 $10, for Part 2 $15, and for Part 3, which carries with it the diploma, $45, making a total of $75—about £15 15s.

So successfully has the plan been received that the National Board's certificate is now recognized by the licensing authorities of thirty-seven States and Territories, and the medical boards of most of the remaining plan to recognize the National Board as soon as their laws can be suitably amended. The Board's certificate is accepted by the U.S. Army and U.S. Public Health Services as the scientific qualification for admission to the medical corps of each of these services. Admission to the Navy is determined by an annual competitive examination. The diploma is becoming increasingly popular in the States. In 1922 only 20 passed; in the year 1927, 450 passed Part 1, 315 Part 2, and 270 Part 3, and obtained the diploma.

This recognition is not confined to the United States; diplomates of the National Board are admitted to the final examinations of the English Conjoint and the Scottish Triple Qualification Boards, and, in return, the National Board admits to Part 3, its final examination, the diplomates of these boards. It is interesting to learn that the Spanish authorities now admit diplomates of the National Board directly to their revalidating examination.

The privilege of admission to the final examination is not at present directly available to our university graduates. There is, however, a way round for those of them who may desire to practise in the States. The three Scottish medical corporations, when they combined to give the triple qualification, surrendered all claims for the recognition of their single licences as admitting to the *Medical Register*. They retained, however, their right to confer them on any suitable candidate whose name was already on the *Medical Register*. Thus, one of your graduates who desires to practise in the United States will be well advised to add to the letters M.B., Ch.B., the L.R.C.P., L.R.C.S., or L.R.F.P.S.

The advantages enjoyed by the diplomates of the National Board have stimulated other forms of effort to achieve the same end. When there were 167 schools, each its own judge of its own merits, the State Boards already mentioned examined everyone who desired to practise within their confines. Now that the standing of all the regular medical schools can be easily ascertained, a practitioner who is a graduate of a good school, and is licensed in his own State, can get a licence in a second State by having his credentials "endorsed" by the second State, without examination. For the man who is satisfied with

one move—and most of us are—this endorsement suffices; to the more restless spirits, and there are a good many of them in America, the roving commission of the National Board, which runs in thirty-seven States, makes a stronger appeal.

This seems an appropriate place at which to quote from the address of Dr. Platter, President of the Federation of State Boards, delivered in February of this year.

"Legislation is an American disease. Our greatest fault lies in strenuous efforts for new legislation, which is supposed to work automatically to relieve or cure a bad situation.

"I have an opinion that we are at the parting of the ways; either we must present a united front with a carefully considered and thought-out programme for general enforcement, or . . . we should quit deluding ourselves and fooling the public and profession, and embrace the British system of licensure. For the present, I prefer to be enrolled in the first group; we should have a Medical Practice Act Model capable of universal adoption . . . it will take perhaps five years to determine the results to be obtained by such procedure. If, at the end of that time, substantial progress has not been made, then I should unhesitatingly recommend that we busy ourselves with the improvement in medical education, and endeavour to have legal recognition given only to those holding proper educational qualifications, and permit the unprepared, the fakir, and the charlatan to practise to their heart's content, restricting them only in that they will have no legal recognition. These are the problems which I believe concern us. I offer you two solutions. The first is in line with the duties imposed upon us when laws creating Boards of Licensure were enacted, and may be characterized as the American 'ideal.' The second closely follows the British system, and may be characterized as 'practical.'"

Not the least difficult part of an address such as this is its conclusion. I have given you a rapid survey of the position in the United States, and from it you can appreciate the differences in methods. Last year, in Chicago, it was suggested to me that I might draw a comparison between the methods of our two countries. I declined then, and I do not propose to do it now. In February, 1928, I described our methods to an American audience and left it to draw its own conclusions; to-day I have endeavoured, to the best of my ability, to describe them to you, and I commend them to your very careful study. There is much that is good in the methods of both countries, and we can each learn much from each other. There are some who think that our American friends are too fond of experiments, and suggest that they too often pull up the seedlings to see how they are getting on. Well, perhaps it is true that the Americans, as a nation, are more ready to make experiments than those of older civilizations, but, after all, this is the privilege of youth, and the less adventurous may derive much benefit from the ventures of the more daring. Co-ordination, co-operation, unification, simplification, rationalization, are the slogans of industry to-day, and they have undoubtedly influenced the reform of medical education in the States. There is a freedom in, and there are opportunities for, discussion which are less frequent here. Every year those interested meet in Chicago for three days to exchange views and discuss new proposals. One evening last February I had the pleasure and interest of dining with the deans of twenty-three medical schools, who had come from all over the States, and Canada. I commend the example to our deans.

When, a few minutes ago, I made a passing reference to the prophet Ezekiel, I was conscious that some of you might scent something of a fallacy. I refer the doubters to their Bibles. In the valley of Ezekiel's vision the bones were very many, like the American schools of medicine in 1900, and they were, metaphorically, very dry. Following Ezekiel's first prophecy, which may be compared with the various reports, there came a noise and a shaking, and the bones came together bone to bone, and then the sinews attached themselves to their proper origins and insertions; later, the flesh came upon them; and last, the skin covered them. "But there was no breath in them." An unfriendly critic might overdo that point, and say that the American schools are too uniform, show too much evidence of mass production, and are too mechanical. But Ezekiel had a second prophecy: he prophesied unto the wind, *and the breath came into them.* There is ample evidence to-day that the breath of freedom is stirring in American medical schools. They are striving for the freedom to try, each in its own way, other methods, some of them new, and some of them old. It will stimulate a healthy upward competition among their schools, all or almost all of them to-day excellent, towards yet higher levels.

THE PLACE OF HUMAN PHYSIOLOGY IN THE TRAINING OF MEDICAL STUDENTS.*

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THE MEANING OF HUMAN PHYSIOLOGY.

IN a lecture delivered before the Harvey Society in New York in 1916 Professor J. S. Haldane of Oxford said: "Medicine needs a new physiology which will teach what health really means, and how it maintains itself under the ordinarily varying conditions of the environment." It would be difficult to frame a better explanation than this of what is meant by human physiology; and the selection of this subject for discussion indicates that a serious attempt has been made to provide such a new physiology.

For half a century before that date physiology had been progressing actively, stimulated by the desire to account for activities of living organs in terms of physics and chemistry. Great strides were made in demonstrating the functions of organs, in determining the mechanism of their action, and in analysing the mechanism in terms of physics and chemistry. These advances in what may be termed "analytical physiology" were the result of experiments on isolated animal organs, by means of which the variables could be eliminated and causal factors studied under carefully controlled conditions. Their effect was to indicate the possible functions of an organ and the causes of its activities. The probable functions of human organs and the probable causes of the activities of these organs in the living body were then deduced. To take a few simple examples: the capacity of such an organ as a salivary gland to secrete a juice of importance in digestion was demonstrated, the conditions of its blood supply necessary for successful secretion were defined, stimuli capable of causing this secretion were discovered, and it was shown that these acted through the nervous system. It was inferred from observations in the human being that the human salivary glands secreted their juices in response to similar stimuli and for a like purpose. The contractions of muscles were shown to be the result of certain stimuli conducted to the muscles by nerves, the physical and chemical phenomena coincident with the activities of the muscles and nerves were seen to be essential, the energy requirements of these experiments were quantitated, and their sources defined. The order of events in the beat of the heart was elucidated, and the dependence of each event on those preceding was demonstrated. The paths of excretion of the waste products were discovered. The characters of the blood, and the variations found in healthy individuals, were defined.

The new phase in thought and in investigation in physiology turns on the meaning and implications of "normal." The human body is exposed to the ever-varying conditions of the environment, and is constantly adjusting itself to them. So long as it maintains its

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