THE CARNEGIE FOUNDATION

FOR THE ADVANCEMENT OF TEACHING

MEDICAL EDUCATION IN EUROPE

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MEDICAL EDUCATION IN EUROPE

A REPORT TO
THE CARNEGIE FOUNDATION
FOR THE ADVANCEMENT OF TEACHING

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WITH AN INTRODUCTION BY
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INTRODUCTION

In June, 1910, the Carnegie Foundation for the Advancement of Teaching published a report on medical education in the United States and Canada.[1] This report not only dealt with the conditions of the medical schools in the United States and Canada, but also attempted an analysis of the problem of medical education. The publication of that report met with immediate response not only from the teachers of medicine in America, but from the medical profession itself, and there was a prompt suggestion that the Foundation continue the work thus begun by a study of medical education in leading European nations. The present report on medical education in the German Empire, Austria, France, England, and Scotland is therefore the outcome of the first report on medical education in the United States and Canada, and is to a very large extent a necessary supplement to it. It has been carried out under the direction of the Foundation by Mr. Abraham Flexner, who made the previous report.

Its plan follows essentially the general plan adopted in the former bulletin. First, there is given an historical statement, which attempts in brief compass to describe the background upon which modern medical education in Europe is to be studied, and the point of departure from which the present undertaking is begun. Like its predecessor, this report concerns itself thereupon with the basis of medical education and the relation of education in medicine to the general system of schools. It considers next the laboratory branches, and following these in succession the clinical studies and the hospital as related to the problem of practical clinical training. Adhering also to the course previously pursued, the author has taken up later the financial aspects of medical education, medical sects, postgraduate education, and the medical training of women. Throughout, the influence of university status on medical education is contrasted with the influence of proprietary conditions.

There is, however, to be noted this marked difference. The bulletin dealing with medical education in the United States and Canada was intended, among other things, for the specific use of the medical schools in these countries. It aimed to describe and to discuss in detail the conditions prevailing in each of the one hundred and fifty-five medical schools then existing in the United States and Canada. The present report is intended to give not a detailed account of the separate schools existing in Germany, France, and England, but rather a picture of contemporary medical education in these countries. The study, therefore, is based upon an examination of representative medical schools and institutions in each country, not upon the examination of every medical establishment. For this reason, no attempt is made to include a separate inventory of every school in the several countries discussed.

In carrying out so extended a piece of work, the coöperation of those engaged in medical education was indispensable. The Foundation desires to express in the most hearty

[1] Copies of Bulletin No. 4, entitled *Medical Education in the United States and Canada*, will be sent on request.

way its appreciation of the cordial assistance that has been everywhere given by those who are connected with medical schools and institutes. Everywhere Mr. Flexner was met with the most generous offers of help, and not only was there every opportunity given to learn the strong points and the best facilities of each institution, but there was also every disposition to discuss in the frankest way the defects of the situation as well. For this ready coöperation on the part of medical teachers, medical practitioners, and educational officials the sincere thanks of the Foundation are tendered.

One word further needs to be said concerning the point of view from which this bulletin has been prepared. It has already been explained that it does not undertake to give a detailed view of all schools or of any one school in these countries, but rather to portray the essential features of medical education and to set forth a contemporary picture of the status of medical education in each of these nations. Such an effort cannot limit itself to mere description, but to be suggestive must also be critical and constructive. To describe the methods and the organization of the schools of these countries without attempting to draw forth such conclusions as the facts themselves seem to suggest would be both short-sighted and unfruitful. The present report, therefore, not only attempts to picture the status of medical education in several foreign countries, but also aims to draw attention to the strong and to the weak points in existing organizations and in present methods of instruction. This involves, of course, in some cases a critical attitude. Wherever criticism has been made, the effort is to present it, not for the sake of criticism, but in order to obtain a complete conception of the situation that may be useful to those who are in any country endeavoring to realize for medical education the achievements of medical science.

It may be added also that while the primary object of this study is the benefit of medical education in America, it was, nevertheless, impossible to treat matters of universal interest from a local and national standpoint. That which makes for the highest interest of medical science and for the true advancement of humanity through this science is common to the whole world. While the work was undertaken in the desire to improve the conditions that now exist in the United States and in Canada, it has been written from the standpoint of the advancement of medical science throughout the world. As the detailed chapters will show, there is to be found in the teaching and in the practice of the older European countries much that these newer trans-atlantic nations may study to their advantage, and perhaps even imitate. It is equally clear from such a careful examination as has here been made that newer countries may profit by the mistakes that have been made, or by unexpected developments that have occurred, in the experience of older nations. To-day, in medicine, as in all other larger human interests, the world is in reality one, and it is a backward and narrow national view which fails to take to heart both the successes and the failures of other nations.

In a study covering so much ground as is here treated, it is impossible to set forth in an introductory statement the important data which are brought forward. To attempt to do so is to omit many of the most significant scientific and pedagogic considerations that are adduced. For most of the questions discussed are not to be resolved upon simple lines. Many factors enter, and to obtain an intelligent picture, those who are directly concerned either with medical education or with medical practice must read the chapters in detail. The report contains also information and conclusions which are of great interest not only to the medical teacher and medical practitioner, but also to the intelligent layman. I venture to call attention to certain matters that are of special interest as viewed from the standpoint of teaching and from the standpoint of social development itself; in so doing, I shall treat the report as an educational document.

First of all, the teacher who examines the two reports upon American and European conditions will realize that medical education is an educational rather than a professional problem. It is for this reason that the report has been prepared under the direction of a teaching organization by a man who is primarily interested in education rather than by one who is engaged in the practice of medicine. This distinction is an important one, for professional education, particularly in America, has suffered from the notion that to train a man for his profession, one must have the viewpoint of the practitioner only, and not the viewpoint of the teacher as well. The education of a physician is primarily an educational, not a medical question, just as the training of an engineer is primarily an educational question, not an engineering question. This does not mean that the physician and the engineer must not recognize finally the point of view of medical practice and of engineering practice respectively, but it does mean that though the content be in one case medical, in the other technical, the methods employed in training physician and engineer involve educational procedures and educational skill. Each of these professions calls for a high order of reasoning, and for training in the observation of fact and in the proper marshaling of facts in order to reach a correct result; each finally involves the acquisition of a high order of skill. All this is education. No matter how unsuccessfully it may have been achieved in this school or in that, however deficient the educational processes to-day employed may be, it nevertheless remains true that improvement can come only from clear educational reasoning, and from a clear educational conception of the capabilities that are needed and the methods by which these qualities may be developed in the student. Whether medical education is dealt with by the layman, by the medical teacher, or by the practising physician, it still remains true that it is at bottom an educational, not a medical, matter.

Considering, therefore, the medical schools in the countries under discussion from this point of view, the most striking fact that emerges from this study is the absolute dependence of professional teaching in medicine upon the general educational system of the country itself. If one admits that professional education is primarily a question of education, this result must necessarily follow; but that admission has not generally been made. One nation after another has undertaken to erect its professional schools upon the frailest foundations of general education. It is not too much to say that in every such instance the result has been a failure. This does not mean that such a system may not bring forth from time to time great practitioners. It happens in the United States and Canada now and again that a brilliant practitioner emerges from a most inefficient and even disreputable medical school. The genius will work out his salvation under almost any conditions, but a system of education is to be judged not by its occasional brilliant successes, but by the general level of performance of those whom it undertakes to train. No one who faces the evidence brought together in these two reports can doubt the conclusion that in those countries in which the elementary and secondary school system is weak, the general level of professional education is low. Under such conditions brilliant practitioners of one profession or another occasionally arise, — they will arise under any system; but the average of training will be low, and the professions will be overcrowded with a large proportion of ill-prepared men, who drag down ideals and gain their livelihood at the public expense. Of the soundness of this conclusion there can be no more striking example than is furnished by a comparison between Germany on the one hand and the United States and England on the other. For the general high level of German professional training the German secondary school is mainly responsible. A sound and well-conceived system of elementary and secondary schools is a necessary precondition to good professional training; one may go even further and affirm unreservedly that any nation that undertakes to prepare men for the professions upon any other basis will, in the long run, impose upon its citizens great and unnecessary hardships.

A comparison of the conditions in the countries here studied throws light upon the precise kind of secondary education which should be provided for intending physicians. The medical curriculum, extended as it is in Europe over five years, has reached the limits of its capacity: it can contain no more. Exactly the same process has gone on in medicine as has taken place in the training of engineers. In fact, experience in these two kinds of technical education during the last fifty years has been strikingly similar. Most naturally, the medical school and the engineering school have endeavored to include in their teaching some knowledge of the new sciences developed in the last half century and of their application. As a result, the burden devolved upon students of medicine and of engineering has grown enormously. Their respective curricula have been formed almost altogether by accretion, something more being constantly put in, little or nothing taken out. As a result, both the medical student and the engineering student are called upon to carry not only a heavier load, but a load made up of more parts. Each now flies from one task to another at such a pace that little time is left for thorough preparation or for serious consideration. Consequently, there is a growing disposition to neglect the great underlying fundamental studies. Twenty-five years ago, the medical student could even include in his curriculum a certain number of literary studies. These have been omitted, to be sure, but he is still expected in most schools to find time for elementary chemistry, elementary physics, and elementary biology. It is clear that educationally we have come almost to an *impasse*, that the load not only cannot be increased, but that for the sake of good teaching it must be lightened and simplified. The medical student and the engineering student must each have a timely opportunity to ground himself in fundamental studies, and to learn how to think, how to observe, how to apply. Every pedagogical consideration, therefore, points to the conclusion that the elementary underlying sciences must be learned by the student of medicine and of engineering before he enrolls himself in the professional school. A youth of twenty, — in America of twenty-two, — who has spent fourteen years or more in preparation, ought surely to find the time for chemistry, physics, and biology in so long a preparatory period.

A wide variation of attitude toward this question in the countries under consideration is clearly set forth in the report. Strong as is the system of secondary schools in Germany, — and the even development of German medical education is mainly due to this, — it still remains true that the German boy may enter the medical school, if he so desires, almost entirely without knowledge of the fundamental sciences and with the expectation of gaining that knowledge in the medical school itself. How unsatisfactory this is from the point of view of sound teaching has already been alluded to. The practical disadvantages entailed are set forth fully in the chapter dealing with this topic.

This question is warmly discussed in the United States to-day. Should the boy who undertakes the study of medicine be expected before entering the medical school to have obtained an elementary knowledge of chemistry, physics, and biology? Very interesting statements have recently appeared in American educational journals, calling attention to the fact that students who lack this preparation appear to have made quite as good showing in certain medical schools as those who have it. Without going too far into an analysis of the facts that are advanced in support of this contention, it needs to be said that even were this true, it is beside the mark. It still remains certain that the youth who has not pursued these fundamental sciences does in the medical school an entirely different thing from the one who has been properly trained in them. Teachers of medicine readily admit that for students who have really mastered their elementary physics and chemistry and biology, medical education becomes a wholly different thing from what it is for those who have not gained that foundation, not only because the man so trained can begin at a different point, but also because he is familiar with scientific concepts, scientific nomenclature, and scientific methods of reasoning.

Even if we may assume that students enter the study of medicine properly trained in the fundamental sciences, the problem of the curriculum is a serious one. The report shows a general tendency toward overburdening. The question naturally arises, What ought the course of study of a technical or professional school to accomplish? The medical school cannot turn out finished doctors; it cannot teach all that it is important for the practitioner to know. Under these circumstances, it does best to accept frankly certain limitations, and so to train its students that they will be disposed subsequently to remedy their own deficiencies. Inclination of this kind appears most likely to result from a training that prescribes only the indispensable minimum, requiring in addition more thorough performance in a few directions and leaving opportunity for still further effort to those of greater energy, interest, or ability. The attitude of the German university on this point is thoroughly to be commended. Every medical faculty in Germany offers more in every department than the undergraduate student can achieve; every student is encouraged to exert himself beyond the average or the minimum in some direction or other. It is therefore not surprising that active progress beyond the point to which his education brought him is generally characteristic of the German physician.

Those concerned for the development of right educational methods will read with interest the discussion of the function of the clinical teacher. It has come to be generally conceded that not only must the basic sciences of chemistry, physics, and biology be taught by those who are primarily teachers and who give their whole time to teaching and to research, but also that the more definitely medical sciences of anatomy, physiology, pathology, and bacteriology must be represented by specialists. It has not been so generally granted that the clinical teacher must also be primarily a man who devotes his life to teaching and to research. This reform is the next great step to be taken in the improvement of medical education in the United States and Great Britain. In Germany only has it heretofore found recognition, and to this fact, next to the development of an orderly and efficient system of secondary schools, is to be attributed the high level of German medical science and medical teaching. With the more general acceptation of the view that medical education is *education*, not a professional incident, the conception of the clinical teacher must undergo the change here alluded to. The teaching of clinical medicine and surgery will then cease to be a side issue in the life of a busy practitioner; it will propose to itself the same objects and conform to the same standards and ideals as the teaching of any other subject of equal importance.

The account and discussion of the professional examinations furnish one of the most suggestive chapters in the bulletin. While the examination cannot alone be relied on to force a high teaching level, it is undoubtedly capable of proving a most potent weapon in forbidding incompetent institutions. The contrast between the German and English methods is most significant. It is clear that the German examination is not appreciably responsible for the best features of German medical education; they must rather be attributed to the high and uniform entrance basis and to the vigor of university ideals. For the American teacher and the American official charged by the state with the admission of candidates to medicine, the careful and practical form of examination carried out in England is of especial importance. English experience clearly shows that such examinations can be administered on a large scale, that they are fair to the candidate, and that, if so administered, they will exclude the manifestly unfit and unprepared. The institution in America of state examinations modeled on those of the London Conjoint Board would at once put an end to schools incapable of giving their students practical laboratory and clinical training.

This report, therefore, when studied by the student of education, carries at least four significant suggestions which bear upon training for professional life: first, the dependence of such training on preliminary education and the necessity for a close relation between the secondary and the professional school; secondly, the part which right lines of study in the secondary school may play in determining the quality of the work which the student in the professional school is able to perform; thirdly, the advantage which the average student derives from a logical arrangement of subjects, provided fair scope for elasticity and election is still preserved; and finally, the wholesome effect of an examination system at the close of the professional study which shall at one and the same time test theoretical knowledge, ability to think, and technical skill.

Turning aside from the consideration of the explicitly educational aspects of the report, I now venture to call attention to certain lessons which it carries for those dealing with medical education in its humanitarian and social relations. Not only is the whole civilized world to-day bound together in the discussion of all questions of scientific, educational, and social progress, but also the people of a given nation are bound together by their common interest in such questions. Education in any nation is one thing, not a series of separate and unrelated things. Under modern social conditions a nation will, therefore, inevitably lack not only industrial power, but also social contentment and efficiency, if it fails to conceive its various educational difficulties as fundamentally a single problem to be worked out by institutions related in the most vital way to one another, and representing together a national conception of progress and betterment.

For this reason professional education is of vital interest not only to those in the professions, but to the average citizen. In particular is this true of medicine. Perhaps no other professional man, not even the priest, is allowed to enter so intimately into individual and family life as the modern physician. Every person, whether he be rich or poor, is concerned that the profession of medicine shall be placed upon the best possible plane, that the men who enter it shall be chosen under good conditions, and that the unfit and the unworthy shall be excluded from it.

While the average intelligent man appreciates this fact in a dim way, as a practical rule of conduct he entirely ignores it. He chooses his physician with very little more care than he chooses his coachman. It seldom occurs to him to inquire what was his previous training and what have been his opportunities. He does not concern himself with the question as to whether he is an educated man. He takes his physician on the recommendation of a friend, or on the basis of accidental acquaintance, and the notion that he should inquire in advance as to the fitness of the physician and as to the quality of his training rarely enters his mind. Moreover, the ordinary citizen fails to appreciate his individual responsibility for the betterment of the profession itself. The future improvement of the profession in such countries as the United States depends to a large extent upon the awakening of the mass of citizens to the importance of their own attitude toward this great profession; for while the progress of medical science will continue to depend primarily on those who are connected with the profession, the elevation of the level of medical practice depends in very large measure upon the intelligence of the average citizen with respect to professional training, and upon his willingness to assume some responsibility in the matter. The following general considerations, suggested by the two reports that have been issued by this Foundation, are, in my judgment, of enormous importance to all classes of citizens. First of all, these studies have served to emphasize, particularly in the United States and Canada, the fact that medicine is a profession, not a trade. Not only is it a profession, but it is one of such enormous importance to society, carrying with it such opportunities for good or ill, that modern society is compelled to regard it as a quasi-public profession. It is not possible to allow complete freedom of choice to any who may choose to enter it. Society is compelled to insist that those who enter it shall qualify themselves for its quasi-public responsibilities and opportunities.

It is precisely at the point where this situation is recognized that the responsibility of the layman begins, for not only is he interested in choosing his own physician, but he has also to legislate upon the conditions which shall determine how candidates are to be admitted to the profession. At the present time, in the United States the conditions under which medical practice may be entered upon vary widely. Each state is a law unto itself, and no agreement will prevail until the people of the various states have come to some general conception of their responsibilities. The obligation to enact statutes fixing reasonable conditions upon which the practice of medicine may be undertaken rests not only upon the necessity for preserving a high level in the profession, but also upon the fact that only by effective legislation can the general public be adequately protected from exploitation by an army of ill-trained doctors, quacks, and charlatans.

From this point of view, the most startling fact that stands out for us is this: faults of one sort or another may indeed be found with the medical schools of England, Scotland, France, Germany, and Austria. But scandals in medical education exist in America alone. In no foreign country is a medical school to be found whose students do not learn anatomy in the dissecting-room and disease by the study of sick people. It has remained for the United States to confer annually the degree of doctor of medicine upon, and to admit to practice, hundreds who have learned anatomy from quiz-compends, and whose acquaintance with disease is derived not from the study of the sick, but from the study of text-books. These scandalous conditions are, it is true, less widespread to-day than they were a decade ago; yet they are still to be found in almost all sections of the country, even in the most cultivated. The State of Massachusetts tolerates in the city of Boston, the State of New York tolerates in the city of New York, the State of Illinois tolerates in the city of Chicago, the State of Missouri tolerates in St. Louis, the State of California tolerates in San Francisco, so-called medical schools that pretend to train doctors, despite the fact that they are almost wholly without clinical facilities. In no European country is it possible to find an educational farce of this description. There, every school has adequate clinical resources under complete control. If the lowest terms upon which a medical school can exist abroad were applied to America, three-fourths of our existing schools would be closed at once. And, let me add, the remaining fourth would be easily and entirely adequate to our need. Managers of feeble medical enterprises in our country pretend that they are making great sacrifices for the public good. This hypocritical pretense ought not to be permitted longer to damage the public interest. No medical school that lacks proper facilities has any other motive than the selfish advantage of those that carry it on; and no civilized country except America at this day allows such enterprises to impose upon the public.

Likewise a matter of legislation and public opinion, as this report shows, is quackery. That quackery is not the result of a high standard of professional education is proved by the fact that it is found in all countries whose laws permit unlicensed practice, whatever the level at which professional education begins. That level is low in England and high in Germany. In neither country do the laws effectively restrain quackery; in both it exists, and in the very cities where physicians are most abundant. In Germany, the quack must indeed register as a quack. He cannot designate himself as a doctor of medicine, nor can he perform certain official duties that the legally qualified practitioner can perform; but under the permission to ply his trade he finds a field waiting for his reaping. Of course, no law can protect the ignorant and the credulous from all charlatans, but a rightly framed statute can make it impossible for the ignorant and illiterate impostor to carry on his gainful trade, and the exclusion of this class means an enormous protection for the whole people. In the United States, under the laws hitherto in existence, the quack is able to provide himself with the degree of doctor of medicine, sometimes by purchase, but oftener by attending a nominal course at some proprietary medical school, and he has not hitherto been compelled even to spend much time in acquiring this pseudo-degree. It remains now for the various states of the Union to enact such laws as will in the first place make it impossible for the medical charlatan to trade in the uncertain zone of the laws in near-by states, and will make it impossible as well for him to deceive the public by a medical degree which does not guarantee genuine training. The law needs to go one step further and prescribe a minimum of general education,—a step which would go further toward eliminating the professional medical charlatan than perhaps all other requirements. For such legislation those who are seeking to advance medical education and to render more useful the medical profession must rely upon the intelligent layman.

One more topic must be briefly, but emphatically, touched on. The reader of this report will note the fact that legalized medical practice in Europe is of one type only. Every qualified physician must comply with the law; having qualified, he may call himself what he pleases. As a matter of fact, he calls himself "Doctor," and rarely anything else. There are, in a word, no medical sects in Europe: the homeopath is almost, the osteopath and the eclectic are wholly, unknown. On the other hand, in the United States, where the medical sectarian is admitted to practice on easier terms, sects flourish, — though decreasingly so. The lesson is plain: sectarianism in the United States is a device that admits to practice those unable to comply with the sounder standards; wherever all practitioners are alike compelled to comply with one standard, almost no one wants to brand himself as a sectarian. Our duty in this matter is to set up and to maintain a single standard in respect to preliminary education, laboratory and clinical facilities, professional education and examination; and this in the public interest solely. That done, time may be trusted to settle the fate of the medical sects.

The layman carries also another direct responsibility to medical education arising out of the control of hospitals which are governed, as are the colleges of the United States, by lay boards. Probably no other men have in their hands so great an opportunity to advance medicine as have the trustees of hospitals.

Hospital trustees in the past have dealt in a somewhat cautious spirit with medical schools in the United States, and this attitude is not to be wondered at, since these schools have in most cases been proprietary concerns, and in the absence of effective entrance requirements the class of students enrolled in them was often not of a character that a hospital could admit to its wards. The reorganization now going on, however, in medical education in this country makes it possible gradually to improve clinical training, but the hands of the universities seeking this progress are tied so long as they are required by the trustees of hospitals to utilize the services of the hospital staff of physicians and surgeons who have been chosen without regard to their fitness for teaching or for research. As matters now stand in the United States, it is important that hospital trustees either do more for medical schools, or do nothing. They should do more for such medical schools as enroll a competent student body, provide adequate facilities and staff for instruction in the underlying medical sciences, and are prepared to assume the expenditure involved in placing clinical education on a sound basis. For medical schools that are upon a proprietary basis, even though they be under the shelter of a college or university, the hospitals should do nothing. In taking this stand, the hospital trustees would not only help the real advancement of medicine, but they would also serve the true interest of the hospitals themselves, for wherever the medical school is in a position to comply with the conditions just stated, the hospital will be helped in every way by close and liberal affiliation. It is entirely in the interest of the sick themselves that the privileges of instruction shall be given to a good medical school. The chapters dealing with clinical education in Germany and Great Britain completely establish the proposition that the patients will in the long run profit by such a relationship, and this notwithstanding the fact that the right of the patient to decline to be used for teaching purposes should be scrupulously respected. On the other hand, wherever the medical school is unable to comply with the requirements I have mentioned, it is in no position either to aid the hospital or to advance education. The trustees of hospitals in the United States in lending the scanty privileges which they now offer to unfit proprietary medical schools are helping to perpetuate the worst education régime in medicine to be found in any country.

There is another point that I desire to commend to the attention of hospital trustees. This report establishes the fact that well-trained young physicians find no difficulty in attaching themselves to the retinue of hospital staff physicians and surgeons in Germany, and thus procuring for themselves the opportunity to carry on active scientific work. In America, this is practically impossible. Members of the hospital staff retain for themselves all the opportunities that the institution affords: if they are too busy with practice or too indifferent to science to use the material, clinical and other, it is wasted. We witness, then, this strange anomaly: an American graduate in medicine can, for the asking, obtain the entrée to the clinics of Berlin, Vienna, or Munich; but in his own country, the doors of the hospital are closed in his face! It is not a pleasant task to disclose the reason back of this unwise policy. To some extent, at least, it is due to the fact that hospital physicians engrossed in practice are unwilling that their prestige should be lessened by the scientific achievements of younger men working in their wards. The laymen in control of hospitals could easily break up this selfish and unprogressive attitude, by insisting that hospital opportunities do not exist for the professional benefit of the visiting staff.

The unwillingness of the hospital trustee in America to permit the resources of the hospital to be used for medical education arises partly out of the fact that he has not yet outgrown the idea that the hospital is intended only to help the man who happens at the moment to be ill. A hundred years ago this was the case, but to-day all disease is approached from an entirely different standpoint. Every physician, every medical school, every hospital, must deal with disease not only with the idea of assisting and bringing back to health the patient who is stricken, but also in the interest of all other individuals and of the community itself. The patient must be used, with all due regard to his own interest, to resolve the problem of disease, and to prevent the recurrence in the community of the illness with which he has been stricken. This attitude toward medicine has not yet become common amongst hospital trustees of the United States. They are still disposed to consider that they have done their full duty when they have given to the patients within their wards skilful medical attention and careful nursing. As a matter of fact, this is only the beginning of their duties, and no hospital can serve either its own patients or its own community more efficiently than by opening its facilities in the fullest way to a rightly conducted medical school. In order that their facilities may be thus used, the staff of the hospital must be chosen by the university on the ground of ability to teach and to investigate, as well as to practise, not by the board of trustees upon other grounds. No hospital can suffer by giving this privilege to a rightly conducted university medical school. The prosperity of German medicine and the eminence of the German hospital are, as the report demonstrates, due to the acceptance of this point of view and all that it implies.

So important is this point in its bearing on the development of American medicine that I venture to call attention to the sharp contrast between the attitude of laymen in control of hospitals in England in the matter of hospital management and the attitude of similar boards in the United States. In England, the trustees of the hospitals admit most frankly their obligation to open the wards to students. They realize that such a relationship is advantageous to their own patients and to the cause of medical science. Throughout the United States medical education will continue to lag unless through general discussion public opinion can be educated to the point where the general citizen will recognize his own responsibilities in the choice of a physician, in the enactment of reasonable laws for admission to practice, and his responsibility as a hospital trustee both to medical science and to the community in which he lives.

While hitherto little has been said to the average man in the United States as to his responsibility for the betterment of the medical profession, certain ideas have become firmly rooted in his mind by reason of the arguments which are continually put forth to procure the perpetuation of proprietary medical schools. One of those most commonly advanced for the purpose of continuing a régime long since outgrown is the claim that a certain number of cheaply trained doctors must be furnished for the sparsely settled districts of the country. Wherever the proprietary medical school is attacked, this is the claim put forward, and so often has the story been repeated that the idea itself has now become fixed in the minds of most laymen.

The information brought forward in these two reports dealing with medical education on the continent of America and in European countries ought permanently to set at rest this contention. If the contention were a true one, if it really is necessary that the resident of the country must put up with a poorly trained physician, then something should be done by society to remedy the situation. As a matter of fact, the statistics here brought together prove that no physician, poorly equipped or well equipped, will go where a livelihood cannot be gained. On the other hand, the experience of Germany, which educates all its physicians at a high level, shows that the well-educated physician will settle wherever a living is to be had.

In fact, of all men who deal with human illness, the country physician needs to be the best trained. He is far away from the specialist; he is without the facilities of hospitals, and hence he must deal alone with situations in which in the city he would have the coöperation of two or three men trained in different fields. It is therefore particularly essential that the country physician should have a broad and thorough training. The experience of Germany proves that the distribution of physicians does not depend upon a low standard of education, and that any country can have as many physicians as it can employ at a high, without resorting to a low, level, if proper secondary school facilities have been provided. In other words, a country which upholds reasonable standards in preliminary education, reasonable standards of professional training, and reasonable legal conditions governing admission to the profession can secure men trained at this level for every village and neighborhood that can give a moderate support to a practising physician. There is no need to resort to the cheap medical school in order to obtain men willing to go to the village or to the countryside.

It remains true, however, that under any system thinly populated country districts will lack medical practitioners. With the problem of furnishing proper medical aid to those living in thinly settled areas, statesmen in all countries will have to deal. The problem cannot be solved by producing a special and cheaper brand of doctor, for the cheaper doctor will go where he can do better, precisely as the more highly trained man will do. A sanitary service, subsidized by the state, will alone render efficient relief in the backward districts without generally demoralizing the profession.

Those who think of resorting to medicine because of its pecuniary attractions will be reminded by the report that on the whole the profession is not financially prosperous. Nor is there in this any cause for disappointment. Under pressure of public opinion, it is becoming each year more and more a profession to which men give themselves from the ideal of service, recognizing that in this calling the average practitioner is to obtain little more than a comfortable living, and in many cases not even that. The youth or the parent who looks toward medicine from the commercial standpoint is in most instances sure to be disappointed. In just such proportion as higher standards of admission to the medical schools and higher requirements of admission to practice are enforced, in just such proportion will the body of men who compose the profession come to be actuated by the ideal of service rather than by the ideal of gain. Under certain conditions and in certain places, individual physicians and surgeons may receive large emoluments, but the average man seldom realizes that such successes carry with them the necessity for enormous expenditures. The man who actually accumulates a fortune in medicine is so rare that he may practically be neglected. As the commercial medical school disappears, and the profession comes to be composed of educated men alive to the ideal of service to their communities and to humanity, the opportunity to exploit medicine for gain will disappear. The youth who is looking for a fortune, or the parent who seeks for his son a remunerative occupation, should look elsewhere.

It is not possible to dismiss this matter, however, without one word more concerning the attitude of the profession itself with regard to fees. In Germany, as is made clear in the report, this is a matter of state regulation. It is also clear that in Germany the payment has been reduced in many cases, by the contract system, far below the remuneration which the competently trained physician ought to receive. The opposite evil exists not infrequently in the United States, where a commercial aspect is given to the entire profession because certain successful physicians exact fees wholly out of proportion to the service rendered. The physician or surgeon who levies upon a rich man a fee of many thousand dollars simply because he is a rich man has exploited the patient at the expense of his profession. He has done what is practically dishonest and unfair, and the exploitation of rich men in this way has worked infinite harm both in the ideals of young men and in the attitude of the general public toward the practitioner. Men who have been guilty of this practice are well known. Some of them are men of great skill and high standing, but there can be no question that in the long run they themselves will suffer in reputation from their ill-judged and mistaken course of action. One result in part due to this attitude of the medical profession in the United States and in England is worth mention. In Germany, medicine has been supported by the government, and we find there medical training, medical laboratories, and medical facilities upon a uniformly high plane. In the United States and in England, medicine has been in the main supported by fees, with the help of such contributions from individuals as the medical school could obtain. In the United States, money has been poured out upon education in the last twenty-five years by rich men with a generosity unexampled in the world's history. Almost nothing of this flood of wealth has gone into the coffers of the medical school, and this notwithstanding the fact that no class of men interested in education have such close and intimate opportunity to influence men of wealth as the practising physician and surgeon. The refusal of benefactors to assist medical education is in great measure due to the fact that medical education has been hitherto largely commercial, and that the successful physician and surgeon levy fees which the well-to-do know to be based on their wealth, not upon the service rendered them.

Notwithstanding all the commercialism that has been mingled with medical education in English-speaking countries, it ought still to be said that in no profession has there been finer devotion than on the part of the representatives of the professions of medicine and surgery, and of all the men who have shone in these professions, those who have served their generations best were the men who gave themselves generously and unselfishly to the cause of medical education. In both England and America, this list carries many names of those who have given the highest service upon the most unselfish grounds. The poverty of support hitherto given, due in large measure to the commercial attitude of the medical profession itself, ought now to disappear. If medicine in all countries is to be placed upon a proper basis, then the requisite number of medical schools must receive support on a scale entirely different from that which has hitherto obtained. Business men in both America and England think to-day in millions, where twenty-five years ago they thought in thousands, and yet they expect those in charge of the medical schools to conduct them on the scale of twenty-five years ago. There is no opportunity to-day, either in England or America, for a wiser use of money, if judiciously expended, than in supporting on the right foundations the comparatively small number of medical schools needed in each country to train men to do the work of the profession. It is greatly to be hoped that those who have means to give may clearly realize that opportunity and their own responsibility; that they may be not only generous in their attitude toward medical education, but discriminating as well; that they will give their money freely, but in the right places. Giving to educational institutions, particularly in America, has too often been haphazard. In medical education to-day, we know what can be done and what ought to be done. There is no field of human endeavor in which a wise giver can do more for civilization in the United States than in this cause. The man who has intelligently thought out the place of the physician in our social order, who realizes the enormous service which medicine is now rendering and is to render in the future, not alone in the cure of disease, but in its prevention, will rise to his responsibility. It will be a serious hindrance in the work of civilization both in the United States and in England if there cannot be found those who will avail themselves of this great opportunity.

In the process of reconstructing medical education, which wise benefaction could now so readily bring about, we in America are luckily free from the most serious obstacle that reformers abroad encounter: we have so brief a history that no very stubborn traditions have been created. Englishman, Frenchman, or German, in the effort to improve or adapt, has to overcome the resistance of long, and in many respects admirable, usage. Plasticity is the good fortune of youth. Let us not suffer our defects to become hallowed by time; let us not suffer the period of ready adaptability to roll by unutilized. There is undeniable danger that we may. When it is proposed to discontinue a medical school in an out-of-the-way place, where clinical material is unobtainable, the "age" of the institution is already alleged as sufficient reason for keeping it up,—just as though inadequacy does not offset all possible considerations, sentimental or otherwise. When the merging of a weak proprietary establishment in a large city with a more promising university department is suggested, the answer is made that the "alumni" of twenty or thirty years' standing will resent the passing of the school which graduated them. Conservatism due to the established usage of centuries has doubtless its advantages; but it has also most serious disadvantages. At any rate, no nation needs to grow old before its time. Our educational institutions cannot yet fairly resist change in the public interest on the score of antiquity. Let us set our house in order before it becomes a more difficult and delicate task to do so; and let us remain youthful and adaptable as long as we can. Science is progressing with amazing rapidity; every advance in medical science suggests a corresponding educational readjustment. Medical education abroad, with all its merits, lags behind medical science, because habit, tradition, and vested interest oppose easy readjustment. If the resourceless proprietary medical school is eliminated in America, if the university medical departments are financially strengthened, nothing prevents us from keeping medical education practically abreast of medical science. We can at once learn from the Old World what we have not yet perceived, namely, the elementary conditions without which medical education should not be undertaken at all; may we not also hope to contribute to medical education something in advance of what Europe has at this moment to teach us?

HENRY S. PRITCHETT.

New York, January 1, 1912.

MEDICAL EDUCATION IN EUROPE

CHAPTER I

HISTORICAL

Medical education has only of late deliberately set out to overtake medical practice; up to quite recent times, whatever the defects of practice, the defects of education were decidedly more serious. This arose in the first place from the mediaeval teacher's veneration for authority and contempt of things,—an attitude that persisted in education long after it had been thoroughly discredited in experience. Hippocrates, Galen, and Paré did not disdain to use their hands; but the mediaeval university, which on the medical side survived far beyond the Middle Ages, confined its medical instruction altogether to theoretical exposition, and until the nineteenth century in the Latin language at that! Drawing a sharp line between medicine and surgery, it regarded the latter as a menial art. As a matter of fact, from the medical standpoint, the hand is a source of knowledge as well as an instrument of relief; and medicine, in discriminating against manual methods, lost touch with reality. Clinical education, therefore, remained for centuries an abstract and pedantic discipline, little affected by the progress making in medical and surgical practice. The same conditions prevailed in what we now call the fundamental sciences. Prejudice against desecrating the human body—that of the dissector, perhaps, as well as the dissected—subsisted long after the epoch-making discoveries of Vesalius. For some centuries, anatomical demonstrations were in most European countries so rare as to constitute a professional, and in some places a social, event. Even so, the hands of the professor were not defiled: a prosector dissected, and a demonstrator pointed out, while the professor read aloud and expounded the authorities. Meanwhile, the student acquired such anatomical knowledge as he possessed by dissecting lower animals, usually a pig. Indeed, the teaching of anatomy by actual participation on the student's part rather than by professorial demonstration is not much more than a century old. Physiology, chemistry, and pathology were, like anatomy, substantial sciences outside, long before they gained the laboratory footing inside, the university. Anatomy got its first independent teaching laboratory at Breslau in 1814; Purkinje's physiological laboratory at Breslau was established in 1824; Liebig's chemical laboratory at Giessen a year later; pharmacology obtained its laboratory start at Dorpat in 1849; pathology, as late as 1856, when Virchow was called from Würzburg to Berlin. In all these cases, educational recognition and adjustment were distinctly tardy. Whether even now the several sciences play in medical education a rôle adequate to their function in medical art and science is a question that will be answered in the course of our present enterprise.

Fortunately, on the clinical side, the meagre training of the continental universities was readily supplemented. Under the influence of the church, hospitals were freely established, and the young doctor, having already heard his lectures and passed his examinations, easily procured in the retinue of a master an experience equivalent to an apprenticeship. With this practical instruction the university had at first nothing to do. Its doctor's degree was awarded on a purely scholastic basis. Practical clinical instruction was first recognized as an essential feature of university medical training at Leyden: there, as early as 1630, the student was expected to examine the patient in the presence of the professor, who thereupon criticized his findings and opinions. The sensitiveness of the students prevented the system from taking root at that time; but early in the eighteenth century it was revived by Boerhaave, under whom the medical clinic of the University of Leyden became the most famous in the world. With Boerhaave's clinic, university instruction in clinical medicine may be said to begin. His pupils transplanted his ideas and methods into fruitful soil at Paris, Padua, Edinburgh, and Vienna.

Paris and the Italian universities had already been important centres of such medical instruction as had been previously current; Edinburgh and Vienna may be fairly regarded as slips cut from the vigorous Leyden tree. Boerhaave was fifty-one years of age when Alexander Monro, the first of his line, became, as Struthers puts it, his "favorite and admiring pupil."[1] His relations with Boerhaave did not terminate when, a year later, he returned to Edinburgh to become at twenty-one the professor of anatomy. He frequently sent patients from Scotland to consult his old teacher at Leyden; more important still, the young Scottish clinicians of Monro's time emulated his example by repairing thither for clinical study. The medical faculty at Edinburgh was thus an avowed exponent of Boerhaave's ideas. The five teachers[2] under whom John Fothergill took his degree there in 1736 had all been pupils of the illustrious Dutchman.[3] Boerhaave's clinical method was carried to Vienna by Van Swieten in 1753; the first university clinic there was established in the Bürgerspital, whence it was transferred to the Allgemeines Krankenhaus, where, thirty years later, Joseph II consolidated the hospital charities of the city.

In the states that now constitute the German Empire, mediaevalism maintained an especially stubborn hold. Toward the close of the eighteenth century, it was reinforced by the metaphysics of Schelling, which intervened like a cloud between the physician and the phenomena it would profit him to observe and reflect upon. The fact is that the medical faculties of the German universities were little more than nominal as late as the beginning of the nineteenth century. In 1805, the total number of medical students in Prussian universities was only 144. At that day, the historian of the medical faculty of Tübingen can still report that students find out-

[1] Struthers: *The Edinburgh Anatomical School*, p. 21 (Edinburgh, 1867).

[2] Monro, Alston, Rutherford, Sinclair, and Plummer. Rutherford was elected professor of medicine in 1726; he gave clinical lectures at the Royal Infirmary for the first time in 1748. (Grant: *Story of the University of Edinburgh*, vol. i, p. 313.) A set of Rutherford's lecture notes in the library of Sir William Osler at Oxford shows how concrete and practical Boerhaave's method was. Clinical teaching in surgery at Edinburgh was inaugurated by James Rae in 1769.

[3] Norman Moore: *Medicine in the British Isles*, p. 154 (Oxford, 1908).

right theoretical instruction less irksome than being interrogated in the presence of patients,[1] and he quotes an apologetic suggestion addressed to the senate of the university to the effect that "it would certainly be useful if the young doctors, who expect to practise obstetrics, had seen at least one birth before undertaking difficult cases where two lives are at stake."[2] More than a quarter of a century later, in 1842, to be precise, mediaevalism was still more or less rampant at Berlin: for in that year, Helmholtz, just graduated as a military surgeon, publicly expounded "the operation of tumors," though he had never yet seen a tumor cut.[3]

The fundamental difference between mediaeval and modern medicine emerges just here. Mediaeval medicine theorizes with or without experience. It starts with a presupposition, a notion, a metaphysical principle, and purports thence to deduce its procedure. Intellectual processes of so dignified a description appear to the vitalist to dispense with the necessity of close observation: percussion, auscultation, and the physical measurement of temperature are, in his opinion, crude methods, incapable of penetrating as deeply into the mysteries of disease as his own purely reflective processes. As opposed to this predominantly deductive procedure, modern medicine strives to be honestly and modestly inductive,—consulting the situation for relevant facts, and cautiously drawing provisional conclusions, subject to revision whenever the issue of experience suggests modification.

It is not possible to fix precisely the time when the scientific viewpoint was first clearly established in medicine: it made its way by slow stages. During the course of the eighteenth century, medicine procured an ever sounder basis in pathological anatomy and increased diagnostic precision through the development of the arts of percussion and auscultation.[4] Such innovations are inevitably associated with a general tendency toward facts and away from "principles," even though at the moment men do not suspect their significance. Indeed, nothing is made plainer by the history of progress than man's inveterate habit of temporarily adjusting really irreconcilable attitudes and practices. The landmarks, therefore, do not indicate the close of one era, the opening of another. The two eras live on together, the one gaining, the other losing. In this sense, Skoda and Rokitansky at Vienna, Corvisart, Laennec, and Louis were the harbingers of modern medicine, which came to completer self-consciousness in Johannes Müller,[5] and finally to total self-consciousness in Rudolf Virchow. Virchow's clean-cut conception of disease as a definite disturbance of function, originating and developing from a specific cause and cellular site, has proved a most fertile postulate

[1] Schleich: *Ein Stück aus der Geschichte der Medicinischen Facultät der Universität Tübingen*, p. 33 (Tübingen, 1910).

[2] *Ibid.*, p. 35.

[3] *Popular Addresses* (translated by E. Atkinson), p. 199 (New York, 1901).

[4] The clinical thermometer, though known to Boerhaave, first came into general use through Traube about 1850.

[5] Called from Bonn to Berlin as professor of physiology in 1832, at the age of thirty-one.

in stimulating investigation; it has entirely expelled speculative mist from medical thought; abnormal phenomena, their origin, course, and outcome, have become problems amenable to the methods of observation and attack that were working out in the underlying sciences.

In consequence, the human body is now viewed as an item in the universe of matter and life, without recourse to essences and principles. The physics and chemistry of organic and inorganic things are recognized to be the physics and chemistry of bodily movement and action, alike in health and disease,—of sight, hearing, digestion, secretion, excretion; embryology, morphology, and physiology are conceived as comprehensive sciences including the human species along with all others. Directive control of the body in disease demands an intelligent knowledge of its structure and functioning in health; and the sources of this comprehensive knowledge are held to lie in the enveloping fundamental sciences above mentioned.

The scientific viewpoint involves formulation of a method and deliberate devotion to it. As to this, a mischievous misconception is still more or less prevalent. There are those who oppose scientific and clinical medicine to each other, regarding laboratory methods as scientific, clinical study at the bedside as empirical. Nothing could be more illogical. Science is indifferent as to where or how observations are made: it is concerned only with the vigor, precision, and consistency of observation. Wherever observation is careful, medicine is there and to that extent scientific; when this critical attitude became characteristic of the field as a whole, the scientific point of view became dominant. The difference between modern medicine and its predecessors is, therefore, not a difference between our laboratory methods and their bedside methods; that is not logically fundamental. Nor is the distinction due to the fact that they never observed rigorously, while we always do; for they sometimes did and we sometimes do not. The difference is simply this,—that unprejudiced and critical scrutiny was with them occasional and precarious, liable to sudden irruptions of fancy or mysticism, while with us it is deliberate, conscious, and as consistent as our mental powers can make it. That is what is meant when the modern way of observing and experimenting is termed a method.

As a matter of history, accurate clinical observation and description are found as far back as Hippocrates, or further. Excellent descriptions of characteristic clinical conditions have been made by physicians in all ages. Such instances of accurate observation form to this day integral parts of scientific medicine. Hippocrates and Boerhaave unconsciously practised scientific method whenever they rigorously observed and described a patient's symptoms; they abandoned the scientific method when they resorted to metaphysical principles in description, explanation, and cure. Modern medicine is simply more consistent, more thoroughgoing. It is so partly, perhaps, but not largely, in virtue of the more general prevalence of skeptical habit, but mainly because of the creation of means for experimentally simplifying the complexes which the earlier physician lacked ways to disentangle. In truth, in the presence of complexes that we ourselves are as yet unable to resolve, men are even now not infrequently as credulous and unscientific therapeutically as their forbears some generations back. The general situation, however, is better because the elemental facts, the logical technique, and the experimental apparatus, by means of which so many knots have been untied already, are in steady use in unraveling others. This is the whole secret of the rapid strides made possible by the experimental method. When Harvey and Hunter and Simpson did their utmost, they were reasoning with unresolved complexes within which definite relations could not be postulated or demonstrated. Shrewd intelligence and large experience carried them far. But, at best, they had to advance by "hit or miss" methods or stand still. Unable to isolate causes, to fasten upon and to exclude irrelevant factors, they had to resort to expedients. Their expedients often availed, but they rarely knew their limitations accurately. Physics, chemistry, pathology, pharmacology, and the diagnostic arts have gone a good distance toward breaking up into fundamental and significant elements what to these earlier physicians were inextricable complexes of symptoms; likewise they have made it possible to deal practically with elements deliberately selected from an involved situation. To the extent that this had previously been done, scientific methods were in vogue; to the extent that it still remains to be done, medicine is not yet thoroughly and satisfactorily scientific. In the narrower sense, therefore, only part of the medical field has been reclaimed. More liberally taken, however, the whole field has been won. For even where the modern physician confesses ignorance and helplessness, follows the will-o'-the-wisp of mere symptoms, or blindly relies on empirical agencies that he does not pretend to understand, he treads warily, with full realization of the nature and extent of the risk that he runs. The sense of limitation with the cool, persistent effort to pierce the barrier at its weakest spot, — this is science. Its spirit has thus subtly transformed even where its arms have not yet conquered.

The German university became the home of this method and spirit early in the nineteenth century. Before that date, scientific men had worked to no small extent as private individuals; the main function of institutions of learning had been to transmit canonical doctrine. The founding of the University of Berlin in 1809, under the influence of Wilhelm von Humboldt, was an experiment by way of ascertaining how far the mediaeval university was capable of answering the needs of the modern spirit. Had the experiment failed, the German university would have withered away like many another mediaeval institution; society would have had to devise some new agency for scientific education and investigation. Beyond question, it would not have been made up of four coequal faculties, nor would any faculty have been created in exactly its present form. Though the university has not proved wholly adequate to contain all the scientific and educational activities that the last century has developed, Humboldt's move is undoubtedly entitled to be regarded as a brilliant achievement. The new wine was successfully decanted into old bottles, even if some new bottles, in the shape of technical universities and research institutes, have had to be provided. Historic continuity has been preserved, while content and purpose have been transformed.

The adjustments forced by the invasion of the university by the scientific spirit touch equally the faculty, the curriculum, the teaching method, the examinations, the equipment, and the expense. Once the medical teacher rotated through the entire curriculum. Even as late as 1850, Johannes Müller's chair at Berlin included anatomy, physiology, embryology, and pathology; the second Monro successfully resisted the endowment of a chair of surgery at Edinburgh on the ground that surgery went with anatomy. Amalgamation of topics persisted as long as transmission continued the main function of the school. The invention of tools—scientific tools, such as sound fundamental concepts, efficient apparatus, technical skill, modern logic—has forced differentiation because a single individual now found all he could do in a small, definitely delimited territory. First, loosely formed aggregates were broken up. Joseph II's scheme had united in one person the teaching of surgery, materia medica, and pathology with the teaching of other branches. These incongruous masses fell to pieces. Next, closely allied, but yet too extensive, fields were provisionally separated, as when physiology and pathology parted from anatomy. In our own day, internal differentiation within each of these fields is taking place, because, as our instruments improve in precision and efficacy, still finer specialization is found profitable. Pathology splits into general pathology and experimental pathology; physiological chemistry tends to become practically independent; medicine disintegrates into inner medicine, psychiatry, pediatrics, dermatology, and inner medicine itself tends to break up into distinct divisions; surgery splits into general surgery, gynecology, orthopaedics, etc. From time to time, the curriculum and the examinations, in the effort to overtake practical medicine and surgery, have noted these changes: physiology was first made a compulsory study in Germany in 1856, pathological anatomy and hygiene in 1869. Most significant of all, in the interval, the passing of scholasticism was expressly recognized when, in 1861, formal logic and philosophical psychology dropped out of the medical curriculum.

With the educational problems created by these progressive improvements, we shall deal hereafter. Meanwhile, it is impossible to exaggerate the importance of the fact that from the beginning of the scientific development just sketched, laboratory and clinical chairs in Germany were of the same status. The salvation of German medicine, as it now turns out, lay in the fact that clinical teachers and practical clinical teaching were already safely housed in the university when the universities took up Humboldt's ideal. Instruction and research, as they developed, were thus bound to affect medicine, if they affected anything. When, therefore, chemistry, physiology, and pathology developed, clinical medicine, being under the same roof, could not escape their application and their stimulus. In the eighteenth century, the professor of medicine and the professor of physics both talked; in the nineteenth, the former got his hospital, the latter his "institute," and both thenceforth produced as well as talked. The clinic was thus at the critical moment already included in the German university on what we should now describe as the footing of a laboratory. This made it possible shortly to differentiate pathology as an independent science, without breaking connection between pathology and medicine. Where, as in England, the clinics remained outside the university, pathology, on becoming a laboratory science within the university, tended to draw away from the hospital. The German clinic threw off pathology; but pathology remained close by, and bore steadily upon it. Virchow kept open his communications with the sick-bed, while attacking pathological problems thence derived, now with histological methods, now with chemical, again by animal experimentation. When, in consequence of the cogency of his point of view, a new type of clinician was created, the university at once had place and opportunity for him. He was indeed born there. Thus, in a decade, the scientific method drove out of university chairs of medicine the last survivors of mysticism, naturalism, and vitalism.

For the first time medicine now rested on an adequate concrete basis. This basis has since then been enormously strengthened by developments in physiology and chemistry, which have furnished additional standpoints from which to study and to attack disease. In the generation immediately succeeding Virchow's great achievements, prolonged training and some independent productivity in physiology and chemistry became the normal basis of a clinical career: here again, medicine, being wholly within the university, was at once fertilized, and has ever since been continuously fertilized, by the new knowledge. Three great schools of physiology have flourished in Germany: Müller's at Berlin, Ludwig's at Leipzig, Voit's at Munich, to one or another of which almost every important clinician of the last fifty years in large measure traces back his lineage. Traube and Frerichs, the former intimately associated with Virchow and especially interested in the application of physical methods to the clinic, the latter distinguished for clinical research on the chemical side, had both been profoundly influenced by Müller. Leyden, at Berlin, Naunyn, at Strassburg, Quincke, at Kiel, were among their pupils; pupils of Naunyn — the third generation of this fecund line — now fill the chairs of medicine at Würzburg, Breslau, and Halle. Ludwig's pupils occupy professorships in Leipzig, Heidelberg, and Berlin. From Voit's laboratory in Munich came Friedrich Müller, now professor of medicine there; his pupils hold posts in Kiel, Strassburg, and Vienna. Medicine and the underlying sciences have thus in Germany played upon each other in the most intimate fashion during the last half century or more. The fundamental sciences have served as foci, out of each of which a clinical school has developed, — a school not in the mediaeval sense of a body of men succeeding each other in the pious office of handing down a tradition, but in the sense of a succession of workers, applying sound methods and fruitful ideas to the elucidation of problems left unsolved by their predecessors. Each generation uses the preceding as its foothold. The splendid achievements of German medicine are, indeed, at bottom ascribable to the contiguity of the sciences and the clinic in the modernized university.

About university relationship itself there is no magic: its virtue depends wholly upon the character of the university. German medicine in the eighteenth century was worse off inside the university than English medicine outside; for the university relation meant in Germany mediaeval pedantry, the non-university relation in England meant contact with disease in hospital wards. In the succeeding century, the university connection in Germany became valuable because the university had become the abode of scientific ideals. Medicine inside the university was exposed to a tremendously stimulating contagion that was bound to give new viewpoints and content; medicine outside the university has nowhere succeeded in obtaining an equally inspiring contact. Whether in the future the university connection will prove equally important obviously depends on the future adequacy of the universities.

The acceptance of the scientific postulate has tended to unify medical education and practice, even while it has introduced new complexities through differentiation. Empirical medicine lacked a broad and substantial basis; it lacked unifying conceptions. In consequence, the field was broken up into several non-communicating divisions: medicine proper, surgery, and obstetrics were cultivated independently of one another by doctors of different grades, the training of each of whom was limited to his particular function. There were thus several kinds of practitioner. On the reorganization of the Prussian regulations in 1825, that is, at the beginning of the scientific era, a distinction was still recognized between doctors who had received diplomas entitling them to practise medicine, and surgeons of the first and second class, who might by additional examination obtain the right to practise midwifery and ophthalmology.[1] The doctor was required first to graduate at a *Gymnasium;* he had then to study for four years at a university. Of surgeons of the first class less extensive preliminary education and only three years' study either at the medical faculty of a university or at a medico-chirurgical school were required; the surgeons of the second class were extremely "practical" men, prepared for their calling by attendance on a "master," or by service in a military hospital. Pathology and physiology soon made division into several species of physician and surgeon untenable. When all medication or relief was conceived to depend on the comprehension of abnormal structure or disordered function, it was no longer possible to set up a fundamental distinction between external and internal diseases, between diseases amenable to manual, and diseases amenable to medicinal, relief. In consequence, the inferior disciplines were abolished in Germany; the surgical schools of Breslau, Greifswald, Münster, and Magdeburg were closed in 1848 and 1849; in 1852, new regulations ordained that thenceforth there was to be only one grade of physician, who should be obliged to pass all examinations and be eligible to all kinds of practice. In Austria, similar distinctions had existed: country doctors (*Wundärzte*) had been bound to only two years of study, though a year was added in 1810. The abolition of the inferior education was first proposed in 1848; but it was feared that the medical faculties of the existing universities at Vienna

[1] Puschmann: *History of Medical Education* (translated by Hare), pp. 585, etc. (London, 1891).

and Prague were unequal to the task of producing high-grade physicians in sufficient number. New faculties, therefore, were constituted at Graz and Innsbruck; after which inferior establishments were suppressed one by one; but not until 1872 did the medical regulations finally recognize the unity of medical science by the total abolition of all inferior grades of practitioner. In England, an inferior grade of practitioner was one of the consequences of the apothecaries' act passed in 1815. Thackeray tells of "the very humble shop in the city of Bath, whence Mr. Pendennis exercised the profession of apothecary and surgeon, and where he not only attended gentlemen in their sick rooms and ladies at the most interesting period of their lives, but would condescend to vend tooth-brushes, hair powder and perfumery."[1] To this the law of 1858, constituting the General Medical Council, put an end.[2] The same evolution has now taken place everywhere: the human body is regarded as an organic whole, to comprehend or remove a disturbance in any part of which requires, first of all, a comprehension of its entire structure and function: for no part is, strictly speaking, separable from the whole.[3] Specialization of function on the part of the physician has indeed been re-introduced in later times; but it is by no means the specialization that once permitted a surgeon to be less intelligent and more ignorant than a doctor, because the surgeon used only his hands, while the physician must employ his brains. The specialization of modern medicine is an extension, a wing built out upon the basis of a common fundamental discipline: the obstetrician, the ophthalmologist, the surgeon—civil or military[3]—must be first of all a physician. Specialization thus rests upon the admitted unity of medicine and surgery; it is a means of securing intensive coöperation. Together the modern surgeon and physician envisage the total interest of the patient, and see each other's procedure from a single central point of view. More thorough knowledge of detailed structure and function, increased possibilities of therapeutic and mechanical relief, have suggested and justified specialization far beyond anything that had previously existed; but it remains specialization qualified and held together by a sound and complete scientific conception of the unity

[1] See Sprigge: *Medicine and the Public*, pp. 15, 16 (London, 1905).

[2] The examinations in Great Britain continued, however, to be partial. The Royal College of Surgeons conferred a general license to practise medicine and surgery, though it held no examination in either medicine or midwifery; so the Apothecaries' Hall gave an equally general qualification, although its examination contained neither surgery nor midwifery. In 1870, the Surgeons added an examination in medicine; some years later, one in midwifery. In 1884, the combination of the two Royal Colleges to form a conjoint examining board practically established the present order. Two years later, an act of Parliament required every qualifying body to institute a complete set of examinations, by combination or otherwise.

[3] The military surgeon is an important figure in continental medicine. In the first place, his training is that of a physician. Afterwards, special provision is made for practical opportunities. In Prussia, for example, army surgeons alone receive interneships at the Charité (Berlin), which, indeed, was loaned to the university as an academic hospital in return for special privileges in the form of interneships granted to prospective military surgeons, for whom, during their student period, a home is provided by the State in the Kaiser Wilhelm's Akademie. See *Charité-Annalen*, vol. xxxiv, pp. 1-178. As to the general topic, see Schickert: *Militärärztlichen Bildungsanstalten*, Berlin, 1895; Lobedank: *Der Militärarzt*, Leipzig, 1903; Klette: *Das Studium der Medizin*, Leipzig, 1904. Puschmann (pp. 558, etc.) gives the facts as to Austria.

of the organism: a very different thing from a crude subdivision of function made in ignorance of the organic unity of the body.

I have explained the sudden rise of German medicine from its low estate by its membership in the university at the fateful time when new and fructifying ideals were there set up. One gets negative proof of the soundness of the contention from England and France. Both were scientifically productive long before Germany woke up from its metaphysical trance. But in neither have productive scientists been long or consistently connected with the universities. They have labored as individuals: Davy, Faraday, Darwin, Huxley, and Tyndall were all their lives without university station, recognition, or even whole-hearted toleration.

Medical education, of course, had nothing to gain from the two dormant English universities as long as they were oppressed by ecclesiastical traditions and management. It was fortunate in its association with the hospital instead. The English medical student was originally a sort of journeyman, who obtained a practical training through actual apprenticeship. The private pupils of the physician or surgeon "walked" with him the hospital wards. At St. Bartholomew's (London), students thus attended the medical and surgical practice of the hospital as early as 1662. Every physician or surgeon had his group of followers, no little friction resulting at times from their factious quarrels.[1] But for centuries the hospitals made no provision for pre-clinical or extra-clinical instruction: a hundred years ago, the London medical student picked up his anatomy at Abernethy's or the school in Great Windmill Street; midwifery in Queen Street; materia medica and chemistry in an apothecary's shop anywhere. Lectures on medicine and surgery were also given as private enterprises, not in the hospitals. Brodie, who came to London in 1801 at the age of eighteen, spent almost two years before he at length entered St. George's, not even then so much a pupil of the hospital as of one of its surgeons, Everard Home, the unhappy custodian of John Hunter's precious manuscripts. The need of more thorough instruction of students and more orderly conduct of the hospital eventually brought the student-groups together: the staff became a faculty, the apprentices became clerks and dressers responsibly participating in the conduct of the wards. The quality of the instruction furnished by these hospital schools varied with the character and ability of the individual teacher. It had the merit of concreteness; for the student was from the first steeped in the clinical atmosphere. But despite concreteness, medicine was hampered by metaphysical and abstract prepossessions. In vain John Hunter opposed "trying" to "thinking." "Don't think, try; be patient, be accurate," he said to Jenner. He was too far in advance of his time. His direction to "be as particular as you can"[2] in observing had little meaning for a generation of physicians who filled out imperfect knowledge by intellectual or imaginative exertion.

The subsequent history of English medical schools brings out clearly the weak-

[1] See, for example, E. W. Morris: *The London Hospital*, p. 187 (London, 1910).

[2] *John Hunter*, by Stephen Paget, p. 123 (London, 1897).

ness inherent in this educational isolation. The purely theoretical clinical teaching of Germany, far inferior at the start to the ward work of the English hospital, had, by virtue of its inclusion in the university, the advantage of position in reference to the future. It was able to take up the scientific viewpoint, method, and content when in due time they were developed. Meanwhile, the English hospital itself underwent no radical change during the nineteenth century. It was a philanthropic institution, supported by the subscription of benevolent individuals who believed in caring for the indigent sick, while the Germans and other impracticable folk prosecuted science besides. There was no lack of brilliant individual performances. The century is dotted with them: the two Hunters, their nephew, Matthew Baillie, Bright, Addison, and Hodgkin, to select a few at random. These men all ran substantially the same course. As unknown youths they became assistants in the dead-house or the out-patient department of the hospital. This was their opportunity; obscurity was their protection. They spent years in working out, on both pathological and clinical sides, the important problems with which their names are severally associated. When, at the close of a decade, they had achieved scientific eminence, they were whirled off into busy practices. The rest of their active lives they spent as prosperous consultants, visiting the hospital and teaching in its medical school of course, but without the leisure, environment, or stimulus requisite to further scientific pursuit. The hospital as an institution was indifferent; other inducement there was none. Fifteen or twenty unproductive years followed. Thus men blossomed early, but they left no seed; they had no scientific heirs; they established no line. Suppose, for example, that Addison had been a university professor instead of merely a hospital and consultant physician. That explicit and dominating relationship to science and to education would have stamped and secured him. Fame would have brought him students to maintain the succession. English physiology was enabled to become a school because it was thus established and protected. English medicine, on the other hand, is but a brilliant disconnected series of brilliant achievements flashing here and there in the skies. The British profession, clinical on the lines laid down by Sydenham and his successors, did not as a whole, in the entire course of the century, succeed in digesting with relish the scientific point of view.

At Edinburgh alone was there a medical faculty within the University,—an influence that undoubtedly made itself felt. But with drawbacks, nevertheless: for the University was itself conservative, and the medical faculty was academic in name rather than in fact. It consisted, in a word, of local practitioners, selected by the town council. After a lively scrimmage for votes, James Simpson, for example, was chosen professor by the close vote of seventeen to sixteen. No wonder that, at intervals, the medical department of the University relapsed into inactivity, so that the prodding of extramural teachers was needed to goad it into action. For, once selected professor, the demands of practice were likely to be disastrous to science and not conducive even to vigorous teaching.

Quite recently there have been indications of a changing attitude,—a deliberate attempt to bring teaching into closer relation with medical thought. Oxford and Cambridge, for centuries a collection of colleges of secondary school grade, have begun to develop under the eyes of the university, scientific institutes of modern type related to all their constituent colleges. Prosperous provincial towns like Liverpool, Birmingham, and Leeds, have realized the industrial and cultural value of modern scientific training. In those busy centres local pride and national interest have stimulated large educational benefactions: physics, chemistry, and physiology have been more or less liberally endowed. Coincidentally with this scientific development within the universities, medicine began to gravitate toward them: little as it had had to gain from them in their mediaeval form, the moment the universities took up productive science, they became the congenial and indeed the necessary abode of medical science and education. Oxford and Cambridge, at which chairs for theoretical lectureships had long since been founded, have now provided modern laboratories for all the fundamental scientific subjects:[1] Cambridge so successfully that it has the largest medical school in England.

The proprietary hospital schools of the provincial towns have apparently been already forced into the local universities. But integration is still far from complete. The universities have indeed full control of the laboratory courses: they possess laboratories, teachers, ideals, and some resources. To them the provincial hospital schools have abandoned without reluctance the thankless and unprofitable laboratory field. Clinical teaching is another matter. It costs little or nothing to demonstrate cases to groups of clinical clerks; the fees amount to something; moreover, every student is a potential source of future consultations. While, therefore, the laboratory subjects are organic parts of the provincial universities, taught with modern appliances by teachers of modern type, the hospitals, as we shall more fully relate in a subsequent chapter, remain outside the university, conducted not by clinicians sought out by the university because sympathetic with scientific ideals, but by local physicians designated by hospital boards for personal reasons.

In London, the situation is less satisfactory on the laboratory side and essentially similar to that in the provinces on the clinical. King's and University Colleges are, indeed, like Oxford and Cambridge, excellently equipped and manned in the laboratory branches. Properly speaking, they are both divided schools, the laboratory half being of academic complexion, the clinical half of a piece with the rest of London clinical teaching. Exclusive of King's and University, the medical schools of the metropolis are hospital schools. They have installed more or less meagre teaching laboratories in the fundamental sciences; and they have deferred to the tendencies of the time by setting up a verbal relationship to the University of London; but as the University of London is only an examining board and the hospital schools have undergone no

[1] For their clinical instruction, the Oxford and Cambridge students repair chiefly to the London hospital schools, though at both places small hospitals are associated with the medical faculty.

essential modification in consequence of their nominal connection with it, clinical education in the English metropolis can hardly be said to have advanced many steps on modern lines. The London hospital school is still essentially a proprietary institution, owned by the faculty, which is at the same time the hospital staff, and maintained because, directly or indirectly, it is commercially profitable. At the present time, therefore, the first half of the medical curriculum is on a university basis at Cambridge, Oxford, the provincial and Scotch universities, and the two London colleges;[1] nowhere in England is clinical medicine of the same status.[2] In Scotland, the University of Edinburgh possesses what appears to be an organically whole medical department. However, both in theory and in practice, the clinical situation there differs essentially from the laboratory situation. The university possesses its own laboratories, and procures its chemist, physiologist, and anatomist where it pleases. But, on the clinical side, it has nothing that approaches such complete control. From a strict university point of view, Glasgow is similarly circumstanced. The university appoints four professors at each of two large infirmaries, bound by agreement to provide teaching wards under their exclusive control; but it would hardly venture to leave the local field in choosing a clinical professor, whereas it is free to bring in a scientist from anywhere. Complete university texture cannot be achieved until transplantation is equally easy in the clinical and in the laboratory branches. The fact that the clinician, unlike the physiologist, having once secured a post, commonly ceases to produce must be ascribed largely to the fact that he has thenceforth nothing to gain —though something to lose—through scientific productivity. The same situation exists in France, where the laboratories are within, the clinics, strictly speaking, without, the university. If, then, progress toward complete university status be regarded as the normal course of development for scientific medicine in the nineteenth century, it is clear that a consistently organized and motivated university school of medicine does not exist in Great Britain or France to-day.

1 University and King's. The London hospital schools also to some extent appoint their teachers of the fundamental branches on university principles.

2 The professors of medicine and surgery at Oxford and Cambridge are selected on university principles, but neither institution has developed clinical teaching. Their medical departments are practically half-schools, their students going to London for clinical training.

CHAPTER II

THE NUMBER AND DISTRIBUTION OF PHYSICIANS

The form in which medical education is organized — university or proprietary — is a matter of social as well as of scientific importance. The two types of medical education involved are in spirit and method opposed to each other. Propositions looking to the conversion of the latter into the former are met by the criticism that they lose sight of weighty practical considerations. It is important, therefore, before proceeding further, to ask whether the needs of a civilized country are satisfied by the number of physicians produced at the university basis,[1] and whether such effort to supply physicians of university type, if successful, requires the augmentation of the number of universities beyond what would otherwise be necessary.

The statistical questions thus propounded are highly intricate. The obvious starting-point would be a decision as to what is the correct ratio of physicians to population. Unfortunately, no single solution of this problem is generally applicable; for though one physician may be able to care for two thousand artisans in Munich, it is quite obvious that a single physician could not render anything like the same service to the same number of scattered peasants in Posen. But there is another difficulty which lies deeper still: what do we mean by the "proper number of physicians"? Do we mean a number sufficient to care for all the sick of the district in question? It might require the efforts of half a dozen men to give adequate medical attention to two thousand scattered East Prussian peasants. There is danger, however, that even one physician might eke out only a precarious living with the whole district to draw on. In a well-to-do and quite densely populated region, the number of physicians that can earn a livelihood would approximate or exceed the number required to care for the sick; in poor or thinly settled regions, the number that can earn a living tends to fall below the number actually needed. Any conclusion as to the "proper number of physicians" must therefore take account of the possibilities of their earning a living.[2] As long as medicine is a vocation in which support must be earned, the endeavor to calculate the necessary ratio of physicians to population in a poor and thinly settled territory is a purely academic exercise. No such ratio can ever be actualized, no matter what educational facilities exist, no matter what educational standards prevail. The entire basis of the practice of medicine must be changed, for such localities at least, before people that cannot support good doctors will be provided with them.

Nor is the distribution of physicians even then wholly an economic problem: for even under more or less favorable rural conditions, the current of population flows toward the towns. The more enterprising, the more able, seek the greater prizes and

[1] The problem of medical quacks is considered in chapter xiii.

[2] See chapter xii.

excitements of urban life. On any educational basis that could nowadays be proposed, physicians are likely to be congested in cities and relatively scarcer in the country. Finally, in comparing different countries, inferences must be drawn very cautiously. In Germany, it is true, medical education is on a university, in England on a more or less proprietary, basis. But the statistical situations cannot be directly compared, as if all other factors were so similar as to cancel one another. How far conditions in one country are significant as to any other is, therefore, always dubious. For example, before a ratio regarded as adequate in one place can be applied with certainty elsewhere, we must assure ourselves not only that people live in something like the same proximity and have something like relatively equal means, but that they are also in something like the same degree of dependence on the family physician: they must be in the habit of consulting or summoning him in the same sort of emergencies, and be equally liable to such emergencies in point of seriousness and frequency.

The general ratio[1] of physicians to the entire population of the German Empire is 1 to 1912;[2] but this ratio is an average between extremes so divergent that it has little significance. East Prussia, for example, is an industrially backward district with small towns, manorial estates, and thinly scattered population; its 2,030,576 inhabitants, occupying 14,786 square miles of territory, are served by 694 physicians, a ratio of 1 to 3070. In Königsberg, its chief city, the ratio is 1 to 844; in the district of Sensburg, the ratio is 1 to 5465; in that of Ortelsburg, 1 to 7718. Conditions are similar in other thinly settled provinces. Posen, for example, with 11,109 square miles, has 618 physicians for 1,986,637 inhabitants, a ratio of 1 to 3214. The more prosperous and thickly settled provinces in the south and west fare better: Brandenburg,—omitting Berlin,—with 15,383 square miles, has 3,331,906 inhabitants and 1366 physicians, a ratio of 1 to 2439; Hanover (14,870 square miles, 2,759,544 inhabitants, 1444 physicians), a ratio of 1 to 1910. In the district that includes Berlin, the ratio is 1 to 849; in that including Köln, 1 to 1335. Taking the Kingdom of Prussia as a whole, the ratio of physicians to population is 1 to 1940.

[1] The statistical material employed in this section is mainly derived from the following sources:

1. *Preussische Statistik*, 204. (Berlin, 1908.)
2. *Statistisches Jahrbuch für den Preussischen Staat*. (Berlin, 1910.)
3. *Oesterreichische Statistik der Unterrichtsanstalten*, 1905–1906. (Wien, 1909.)
4. *Oesterreichische Statistik der Sanitätswesen*, 1906. (Wien, 1910.)
5. *Medizinal-Kalendar* 1910. (Berlin, 1910.)
6. *Medizinal-Schematismus für Oesterreich*. (Wien, 1905.)
7. Eulenburg: *Die Frequenz der Deutschen Universitäten*. (Leipzig, 1904.)
8. Lexis: *Die Deutschen Universitäten*. (Berlin, 1893.)
9. Simon: *Statistisches Taschenbuch*—1910.
10. *Statesman's Yearbook*—1908.
11. Rabe: *Aerztliche Wirthschaftskunde*. (Leipzig, 1907.)

In addition to these published sources, much information has been courteously supplied by officials of the Ministries of the Interior at Berlin and Vienna, the General Medical Council, London, etc.

[2] This fails to take account of two factors which greatly abridge the field of the medical profession: midwives, of whom, in 1907, there were in Prussia, 20,878, or 1 to every 1816 inhabitants (*Preussische Gesundheitswesen*, pp. 452–462, Berlin, 1909), and quacks, also very numerous. As to the latter, see chapter xiii.

The other states of the German Empire show, on the whole, similar conditions: witness Bavaria, ratio 1 to 1925; Saxony, ratio 1 to 2015; Württemberg, ratio 1 to 2130; Baden, with a ratio 1 to 1397, is somewhat more abundantly stocked. The larger cities prove, of course, everywhere powerful magnets: Munich, with 538,983 inhabitants, has 845 physicians, a ratio of 1 to 637; Leipzig, 502,605 inhabitants, has 439, a ratio of 1 to 1144; Stuttgart, 205,591 inhabitants, has 229, a ratio of 1 to 898. In Bremen, the ratio is 1 to 1093; in Hamburg, 1 to 1227; in Charlottenburg, 1 to 440; in Kiel, 1 to 696.

Whether these ratios indicate scarcity or plethora can be settled only by examination of the economic conditions prevailing within the profession. The German doctors must earn their living. Do they? I may so far anticipate a subsequent chapter as to state here that the financial condition of the profession is distinctly unsatisfactory; that is, even on the university basis, more doctors are produced than can be supported decently. An agency is maintained at Leipzig through which physicians seeking an opening can be directed to eligible places: in 1908, there were 898 applicants and 618 openings.[1] Increased output at a lower educational level would not help matters; it would only further increase the professional proletariat of the cities. This is clear from two considerations: even in the most unattractive of the districts above mentioned the small towns are well supplied. In the Ortelsburg district, there is a doctor at Friedrichshof with its 2051 inhabitants, one at Mensguth with 1154, four at Ortelsburg with 5079, two at Passenheim with 2084, and one at Willenberg with 2382. In the Sensburg district the same holds: Alt-Ukta with 1119 inhabitants, Peitschendorf with 1039, have one physician each; Nikolaiken with 2287 has two, Sensburg with 5838 has six. In general, wherever there are people enough to maintain a physician, one is found, despite the obvious preference for larger towns.

On the other hand, the outlying regions lack physicians simply because they are too poor to pay for them,—a fact that is rendered clear by the income-tax returns. Free of income tax in Prussia are those whose yearly income does not exceed 900 marks ($225). Clearly, persons who pay no income tax cannot afford to pay doctor's bills; not improbably many who pay the income tax are unable to pay a physician. Let us, however, omit this latter class. According to Rabe,[2] there were in Prussia in 1903 35,114,667 inhabitants, of whom about eleven per cent—4,217,330—paid the income tax; of this number sixty-five per cent—2,602,092—lived in towns, thirty-five per cent—1,615,238—in the country. It is obvious that a large percentage of the rural population—especially in East Prussia—are economically unable to support a physician at all. No reduction of educational standards such as can be seriously entertained would attach physicians to districts in which the population is so meagre, so scattered, and so poor that medical practice cannot possibly yield sub-

[1] *Aerztliches Vereinsblatt für Deutschland*, 1910, No. 765. As to financial conditions in the German profession, see chapter xii.

[2] Pages 67, 68.

sistence. The solution of this problem is to be reached, as we shall shortly suggest, by an entirely different procedure.

For the present, therefore, we may pass by those sections of the country that are too poor to maintain a doctor in any event; in view, too, of the general prevalence of more doctors than are properly supported, we need not try to determine what would, after all, be the safe ratio in each of the various types of community. The really interesting questions from the educational point of view are: (1) as to whether university standards of medical education are consistent with an output of doctors great enough to fill the posts capable of sustaining them; and (2) as to whether a limited number of universities have expansive power enough to respond to such a demand.

There are now, as there have been for almost a century past, twenty-one universities in the German Empire.[1] At the beginning of the nineteenth century, when the territories included in the present empire possessed about 19,000,000 inhabitants, medical education was still so loosely organized that the universities furnished but a fraction of those practising medicine or surgery in Germany; since the middle of the century, they have supplied all the recognized practitioners. Twenty-one universities functioned for the whole of what is now the German Empire when the population was some 40,000,000; they function now for the same extent of territory with its population exceeding 63,000,000. In 1885, there were 15,764 licensed physicians for a population of 46,858,000, a ratio of 1 to 3000; in 1898, there were 24,725 physicians for a population of some 54,000,000, a ratio of 1 to 2200; in 1909, there were 30,558 physicians to 63,000,000, a ratio of about 1 to 2000. Between 1885 and 1909, a period of twenty-four years, the number of physicians had increased almost 100 per cent — that is, about three times as fast as population in the same interval.

In the winter semester, 1830–1831, 2355 students were enrolled in the medical faculties, 78 for each 1,000,000 inhabitants; in the summer of 1848,—a troubled era,—the number of students decreased to 1506; thenceforward it rose (gradually except during the eighties, when the rise was very rapid), until in 1890, the registration reached 8724, about 180 to each 1,000,000 inhabitants; it fell to 5903 in 1905; increased to 9648 in the winter of 1908, and to 11,240 in the current semester.[2] It would appear, then, that a chain of well-developed universities is capable of very considerable expansion to meet progressive conditions. Wherever social and professional status depends on education, a powerful motive drives the more gifted into the universities. High standards, a lengthening curriculum,[3] and relatively few universities thus not only involve no necessary shortage, — they are even quite compatible with over-production,[4] for the drop from 8724 in 1890 to 5903 in 1905 in the face

[1] Münster, however, has only two faculties. [2] Winter, 1911.

[3] The student enrolment has not been kept down despite the fact that in recent years the required course has been made a year and a half longer.

[4] Over-production meaning not that there is an excessive number of physicians everywhere, but an excess wherever physicians will locate at all.

of an increasing population probably indicates previous excessive production as well as automatic action in the direction of checking supply.

Let us consider the matter from another point of view. I have pointed out that universities are elastic, that a given set of institutions can accommodate an increasing student body. There must be, of course, a limit to such accommodation. Has it been reached in Germany? At this day, with the largest registration in the history of the German universities, only two medical schools are dangerously large: Munich with 2148 students,[1] Berlin with 1646. Three others are near the danger-point: Leipzig with 746 students, Freiburg with 718, and Würzburg with 617. The other sixteen average 332 apiece, the number at Rostock falling to 172. The average attendance, including all the universities, is 533.

Whether or not the medical faculties are on this showing overtaxed is, however, a question that cannot be settled by a mere inspection of numbers. In recent years, the period of medical study has been lengthened: this extension involves an apparent rather than an actual increase of the medical student body; for if every student is detained an extra semester or two, the number of students in attendance at any one time is greater, although the actual number of those who pass through the course remains the same. If, at the same time that the course is extended, additional facilities are provided, pressure is not increased, though the apparent student body has been.

Again, the active student body — the student body, that is, that constitutes a tax upon the teaching resources of the university — is smaller than the enrolment.[2] A fraction — how considerable a fraction it is perhaps impossible to say — attend lectures irregularly, and cumber very slightly the laboratories or the wards. Benches, thronged in the early days of the semester, usually have room enough long before its close. For example: clinical students are called down into the arena to participate in demonstrations;[3] I have repeatedly heard anywhere from three to a dozen names called before a response was obtained.[4] Moreover, the Germans make no effort to distribute students according to semesters. The presence of 500 students does not mean that 50 are following work laid out for each semester. Students are divided only as between those in the first half of the course, covering five semesters (the sciences), and those in the latter half, likewise five semesters (the clinics). On either side of this line, a given lecture course will enroll students of all the semesters in question: those in their first and those in their fifth may attend the same exercise; those in their sixth and those in their eighth may attend the same clinic. Moreover, on either side the dividing line, lecture courses may and sometimes must be heard twice; not infre-

[1] Winter semester, 1909–1910.

[2] Billroth's experience (1886) seems unusually unfavorable: "About 450 students were enrolled last semester in my clinic; and yet the amphitheatre was often empty; scarcely 50–60 came regularly, most of these foreign physicians. If a student was called to act as 'Praktikant' and chanced to be present, as a rule he never came again." *Aphorismen*, p. 8 (Wien, 1886).

[3] "Prakticieren." See page 175.

[4] Failure to respond may be due to either absence or timidity.

quently they are heard still oftener. More effective organization might greatly reduce these audiences. Preference for the more attractive lecturer, or for the professor who is an examiner too, operates also to bring about congestion at one place, scarcity at another, quite without reference to paper calculations aiming to prove or to disprove the overtaxing of capacity. Undoubtedly, there is overtaxing at certain points,—in this laboratory or that, in this clinic or that; but this may signify a defect of organization or teaching method, as well as a defect of resources. A medical course running through ten semesters might absorb 500 or 600 students without much pressure at any one place; whether any existing school could handle three or four times that number is, of course, another question. As long, however, as the average per school does not exceed 500 divided among ten semesters, the call for new universities may be less urgent than the call for more effective organization of those that exist.

There is, however, a certain misconception involved in the supposed averaging of enrolment. It would be unwise to equalize enrolment: in the first place, because, while material and facilities are in one place inadequate to a body of, say, 250 students in each half of the course, the facilities of other schools would be wasted under such a limitation; again, because students vary so greatly in the way they respond to conditions that an adequate system of medical departments should contain a few schools much smaller than others.

But whether wise or unwise, it is not feasible. The student body in Germany cannot be arbitrarily regulated without disturbing one of the most valuable features of German academic life, namely, the ease with which the student wanders from university to university. Omitting those in their first semester, more than one-half of the entire body of German students change universities in the course of their studies, no inconsiderable minority changing more than once.[1] The motives that affect migration may not always be scholarly. The student wanders, indeed, in order to come in contact with a great thinker or to procure larger opportunities; but not only so. Seasonal and local attractions cut a figure: winter sports favor Freiburg, aquatic interests work in behalf of Kiel. The German student loves to taste a varied experience: he wants to feel the contrast between the severe north, as he finds it at Greifswald, and the lighter-hearted south of Munich and Heidelberg. He finds it worth while, too, to reckon with another sort of severity, namely, that of the examinations.[2] Over and above all, the big city is the powerful magnet which nothing but autocratic prohibition could possibly offset. An increasing percentage of the total student body

1 *Preuss. Statist.* 208, p. 141, etc.

2 Wherever the numbers examined for degrees are relatively much greater than the student body, reputed ease of examination may be a factor. For example, in 1906–1907, Heidelberg enrolled 3.86 per cent of all law students in Germany and examined 15.72 per cent of all who came up for degrees; in 1909–1910, the percentages were 4.37 per cent and 18.67 per cent. No equally marked discrepancy is to be found in medicine, though Leipzig, in 1906–1907, showed 7.61 per cent of all students and 13.96 per cent of all doctor examinations, and in 1909–1910, 6.60 per cent of all students and 11.64 per cent of all doctor examinations. Waentig: *Zur Reform der Deutsch. Univ.*, pp. 39–45 (Berlin, 1911).

is found at Berlin, Munich, and Leipzig: 33.5 per cent between 1851 and 1855, 41.7 per cent between 1896 and 1900. Since the establishment of the empire, the trend toward centralization is unmistakable. One-fifth of all university students in the German Empire are now found in Berlin.[1] Eulenburg maintains that the city itself has come to exercise a more powerful influence than the faculty.[2] Mere increase of the number of universities might have the effect of reducing enrolment at the small institutions where it is not now excessive, rather than seriously to tap the three metropolitan institutions toward which the tide sets so strongly.

Some disparity in size, therefore, is a thing to be accepted and reckoned with. Certain of the faculties should then not be expected to enroll over 300 or 400 students. Should any of them be compelled or allowed to handle 1500 or 2000? That depends on the methods of teaching. We shall have occasion to observe that the methods of teaching now employed do not vary essentially between Giessen, where there are 331 students, and Munich, where there are more than six times as many. Mass methods are followed in both: the lecture is in general use, irrespective of the size of the student body. But a lecture to 30 students and a lecture to 300 are, nevertheless, very different things. So pronounced a difference in degree almost constitutes a difference in kind. In the smaller institutions, mass teaching is greatly mitigated by the casual contact of student and teacher. It would be, moreover, a simple matter to introduce improved methods into the smaller schools: is it feasible in the largest? The question is extremely difficult to answer. The German professor is simultaneously teacher and investigator; his administrative responsibilities are intended to be subordinate to his educational and scientific activities. A small department can be so conducted that a teacher keeps his contact with students, and conducts research because there is little administrative detail. Are the same sort of personal contact with students and the same active participation in research compatible with the administration of a huge department? Certainly not on the part of a single chief, though a sufficiently numerous staff — not as yet provided — might conduct the work on the whole acceptably. Under such conditions, there would undoubtedly be greater waste of student ability than in smaller schools; that is, fewer students would enjoy direct contact with able instructors. On the other hand, the unusually strong would undoubtedly come to the surface; and the general level of training under the supposed conditions might still be high enough to protect society.

A second solution of the problem of the large school is conceivable: the several departments might be duplicated. On the clinical side, this device has had to be employed at Vienna, Munich, and Berlin, where the number of beds in certain departments has grown too large for a single service. The educational situation is relieved, however, only in so far as students voluntarily disperse through the three clinics. On the laboratory side, no such duplication occurs except partially in anatomy. We may

[1] Eulenburg: *Frequenz*, p. 262. [2] *Ibid.*, p. 264. Billroth concurs: *Aphorismen*, p. 24.

concede, therefore, that as far as gross attendance alone indicates, individual universities — Berlin and Munich, for example — are now overtaxed, while still we maintain that the German universities as a whole have stood the strain of the last half century well enough to prove the possession of unsuspected elastic power; we may even take the position, as I hope to show, that over-pressure such as now exists calls for reorganization of teaching before any considerable addition to the number of existing universities is undertaken.[1]

We have thus far considered the question of over-pressure from one side only, namely, that of total registration. But the total number of enrolled students in medical faculties is in Germany less significant than the annual output of physicians,[2] for, under the conditions of the German universities, part of the student body inflicts, as we have pointed out, no strain on its teaching capacity: they are passive hearers, and perhaps not always that. In two semesters, 1885–1886,[3] with an average registration of 1174 medical students at Berlin, 111 doctors of medicine were there graduated; in the two semesters, 1892–1893, with an average registration of 1149, there were 182; in 1901–1902, only 50 (average registration 1084); in 1905–1906, 80 (average registration 991). Graduating classes of this size in Berlin would, as such, tax nothing, — not plant, organization, or teaching method. Nor do these figures mean that the German student, taking advantage of his liberty to migrate in the last semester, resorts in large numbers to smaller universities in the hope of getting an easier examination and there overcrowds them; the following table shows the contrary:

Number of Graduated Physicians at Prussian Universities

Year	*Berlin*	*Bonn*	*Breslau*	*Göttingen*	*Greifswald*	*Halle*	*Kiel*	*Königsberg*	*Marburg*	*Total*
1885–1886	111	56	20	22	55	30	20	9	14	337
1892–1893	182	64	15	29	67	32	61	20	33	503
1901–1902	61	45	53	36	41	42	113	34	38	463
1905–1906	80	41	28	35	35	40	53	25	24	361
1909–1910	108	43	38	26	34	27	73	28	20	397

That is, nine Prussian universities averaged 38 graduated doctors in 1885–1886, 56 in 1892–1893, 52 in 1901–1902, 40 in 1905–1906, 44 in 1909–1910. Taking the entire German Empire, and counting "approbierte Aerzte" instead of "promovierte," the following table represents the total output in each of several years with the average per university:

[1] The situation in London suggests still another solution, the creation of complete, but separate schools federated as the university. See pages 218, 219. The plan is hardly imaginable for Germany.

[2] "Approbierte Aerzte," that is, those who have passed the state examination. Whoever passes this examination is a "Praktischer Arzt." In order to obtain the degree of doctor of medicine, a second examination must be passed; those who pass it are "promoviert." The number of those "approbiert" exceeds the number of those "promoviert," although for our present purposes the difference is not material. For example, in 1889–1890, 499 were "promoviert" in Prussian universities, 564 "approbiert." See *Preuss. Statist.*, 208, p. 198, and Lexis, vol. ii, p. 406; also chapter ix.

[3] Summer semester, 1885; winter semester, 1885–1886.

Year	*Total "approbierte Aerzte"*	*Average per university*
1877–1878	524	25
1885–1886	998	48
1890–1891	1570	75
1899–1900	1384	66
1902–1903	1551	74
1908–1909	942	45

These comparatively small totals and averages taken in conjunction with the rapid increase in the size of the medical profession testify to the fact that a small number of universities possess surprisingly great productive capacity. They suggest, moreover, that in a course of training occupying ten semesters, the students going forward to graduation, if fairly stratified, would not in general be likely to be excessively numerous at any one stage. Furthermore, if graduating classes of the above sizes are adequate, the question arises whether they cannot be obtained from a smaller student body. These facts again suggest that no considerable increase of medical faculties in Germany is called for: at most, a certain degree of reorganization may be timely. Such reorganization might affect the enrolment in one of two ways: it might decrease the number of students enrolled, for it would increase the severity of the study; or it might, without increasing the total size of the student body, increase the number who successfully achieve the medical course. Fortunately, in Germany the creation of universities is not a matter of local pride or personal whim. Though the present locations are due largely to historic accident,[1] the government has made the best of it, and is not likely to repeat historic misfortunes. The proposal to establish a university at Frankfort is undergoing most careful consideration, and any institution created there will take note of the existence of Giessen, Marburg, Heidelberg, and Würzburg in the vicinity.[2]

The problem of the back country, however, remains. There dearth exists, and will continue to exist on any conceivable educational standard, as long as the situation is left to itself. It cannot be cured by lowering standards, for economic and social interest will still impel educated men toward the towns.[3] In the old days, the inferior surgeon (the so-called "Wundarzt") was denied freedom of locomotion: he was licensed to ply his art—or trade—in a prescribed locality; but democratic progress has made this species of professional villeinage impossible. Moreover, the ethics of the case enter into the reckoning. "I hold it unrighteous in principle," declares Billroth, "to give country people worse doctors than city people."[4] An organized sanitary

[1] Eulenburg very aptly remarks: "That Köln should have lost and Erlangen retained its university cannot be reconciled with sound policy." *Frequenz*, p. 273.

[2] It is worth pointing out once more that German universities exist now in large towns, now in small. Nowhere does one encounter the notion that a town should possess a university or a medical school merely because it is large, well situated, or commercially important.

[3] In 1871, 23.7 per cent of the population of the empire was urban, 76.3 per cent rural; in 1900, 42.26 per cent was urban, 57.74 per cent rural. An occupational census tells the same story of strong current toward the cities; in 1843, it is estimated that 61 per cent of all persons earning a livelihood were employed in agriculture, forestry, fishing, etc.; by 1895, this had decreased to 35.7 per cent. (Dawson: *Evolution of Modern Germany*, chapter iii, London, 1909.)

[4] *Aphorismen*, p. 55 (Wien, 1886).

service, maintained by the state, will alone bring competent and steady medical relief to those who cannot pay for it themselves.

The situation in Austria,[1] while more undeveloped, follows in general the German lines. A population of 28,000,000 is served by a profession of 13,202,—a general ratio of 1 to 2120. Since 1905, the population has increased by 4 per cent, the number of practitioners by 6 per cent; so that at the moment the two move fairly well together. But between 1887 and 1905, while population increased 30 per cent, the medical profession increased 76 per cent. In 1889, there was one physician to 3243 inhabitants; in 1900, one to 2477; to-day, one to 2175. Marked fluctuations have meanwhile taken place in the numbers annually graduated—574 in 1889–1890, 759 the next year, 857 in 1894–1895, after which there is a steady decline until 1904–1905, when 375 were graduated; at substantially that figure, the output has since remained, the graduates in 1908–1909 numbering 393. Between 1887 and 1895, 5075 doctors were graduated; between 1896 and 1905, 7225. This is the output of five medical faculties employing the German language. Obviously, here as in Germany a small chain of universities possesses great elastic power. That five medical faculties suffice does not, however, follow, for the average enrolment is now 736. More than thirty years ago, Billroth urged the creation of new medical faculties, by way of remedying the congestion at Vienna, still unrelieved.

In respect to distribution, we are again confronted by the dilemma that arose in dealing with Germany: are we to start with population and territory on the one hand, or with the opportunity for self-support on the other? Physicians are superabundant where a livelihood can be earned: Olmütz has one for 390 inhabitants, Innsbruck one for 485, Graz one for 530, Vienna one for 670, Salzburg one for 770, Pilsen one for 950, Triest one for 1010. If the supply of doctors is to be regulated by their opportunities to earn a livelihood, Austria is thus even now probably oversupplied, for complaints of the impossibility of making ends meet are general and bitter. On the other hand, in the poorer country districts, medical relief is obtainable only with difficulty, and as the population is both too scattered and too poor to pay for medical service, the scarcity can hardly be relieved without governmental subvention. In the district Görz-Gradiska, 56 physicians must serve a population of 232,897, a ratio of 1 to 4158; in Carniola, 100 for 508,150, a ratio of 1 to 5081. Nor is this obvious stringency much relieved by the survival in all Austria of some 600 of the inferior surgeons admitted to restricted practice prior to 1872. As long, however, as small towns and country neighborhoods in which physicians of university training can earn a modest competency do not lack for them, the problem is, here as in Germany, economic and political, not educational; for even if lowering of educational efficiency were ethically thinkable, there is no reason to believe that it would effect the desired

[1] The Austrian situation is complicated by racial differences. The text refers only to its German-speaking universities.

object. It would be more likely to result in an aggravation of objectionable conditions in places already supplied.

We have now noted in Germany and in Austria the influence of a clean-cut university relationship on the statistical aspects of medical education; let us see what happens in England and Scotland under conditions but partially emancipated from the proprietary régime. The bearing of proprietary education on matriculation standards and on the quality of medical training will be discussed presently in the appropriate chapters.

First of all, as to the number of schools: with a joint population of 36,999,946 inhabitants, England[1] and Scotland now possess 27 medical schools:[2] that is to say, as compared with Germany, a population 46 per cent less maintains 29 per cent more medical schools. In terms of output: the average annual registration of physicians in England and Scotland during the last five years[3] has been 513, an average of about 19 per school, which includes some at least whose education was not received in the British Islands. This evident dispersion of the student body among a needlessly large number of medical schools enfeebles the stronger institutions, while enabling weak schools to protract a useless existence. Thus in the London schools in 1905, only 18 full students entered Middlesex Hospital, 24 entered Charing Cross, 22 King's College Hospital, 13 Westminster, and 18 St. George's. Meanwhile, the stronger schools were not large: the entering class at the London Hospital contained 83 full students, that of St. Bartholomew's 60, that of St. Mary's 44, that of Guy's 63. As the proprietary school must live on its fees, it is clear that improvements can be effected only by concentrating resources; but it is precisely concentration that the proprietary interest opposes. The London schools, for example, are said to spend £10,000 annually in salaries for the teaching of anatomy; yet till recently only a single anatomist was paid above £400, and not a single department is adequate to modern requirements. Meanwhile, the semi-university provincial schools are also weak in numbers and resources: Liverpool, for instance, has an entering class of 34; Sheffield has 40 students, all told.

It is clear, then, that the proprietary form tends to increase the total number of schools, involving necessarily the occupation of the local field by relatively weak competing institutions. Why not? If one hospital staff selected for personal reasons finds it profitable to engage in medical education "on the side," why not another? The moment the university relationship is regarded as essential, competing schools tend to consolidate. Wherever university ideals prevail, as in the laboratory departments of the provincial universities, unity results: witness Liverpool, for example,

[1] Including Wales.

[2] In this estimate, University College and University College Hospital Medical School (London) are counted as one, although, strictly speaking, they form two half-schools; the same is true of King's College and King's College Hospital Medical School. Nor have I counted certain drill-schools such as still survive.

[3] Taking the last twenty-four years, the average annual registration in England and Scotland was 572.

where the fundamental branches — chemistry, anatomy, etc. — are offered by the university in exactly the same way as Latin or mathematics. But wherever a trace of proprietary or commercial interest survives, combination halts. Apparent unity in such instances needs to be probed carefully. At Liverpool, up to 1902, all medical students received their clinical training at the Royal Infirmary. But there were three other general hospitals in the town: their respective staffs offered clinical instruction at lower rates and captured a considerable part of the trade. Peace was made by an amalgamation which spread the name of the university over all, without modifying in any wise the character of any one of them. Apparently, the three clinical schools exist no longer; but they exist none the less. Printing the aggregated staffs of three hospitals in one list does not alter the fact that each of the three hospitals is a separate clinical school, over the internal conduct of which the university has no control. An identical situation exists with an even smaller student body in Sheffield. In London, despite nominal inclusion in the University of London, the thirteen schools remain competing proprietary institutions with all the educational and professional demoralization consequent upon low ideals and varying personal interests. Three of the schools[1] have indeed discontinued the laboratory branches because the income from fees was inadequate to sustain them; but they still maintain undergraduate clinical classes. As the hospital staff in London is composed, as a rule, only of consultants, it is obvious that suppression of a medical school cuts off an important source of consultant business. Superfluous and competing local schools are almost bound to exist where medical education is proprietary in form. That education suffers from the dissipation of resources, the scattering of students, and the ascendency of commercial objects, the British medical student has certainly discovered. Hence, despite the modern tendency toward centralization in great cities, despite the enormous clinical wealth of the London hospitals, the enrolment in the London hospital schools has steadily declined: in the session of 1880–1881, 778 new medical students came up to London; in 1890–1891, 657; in 1900–1901, 536; in 1904–1905, 413, a loss of 47 per cent in twenty-five years.[2] In the same period, the provincial medical schools increased from 257 to 353, — 37 per cent.[3] This unmistakable demonstration of relative educational deterioration has had no effect in diminishing the number of London schools; there is no good reason why one business enterprise should get out of the way of another, when, small as the business may become, an individual who does but little is still pecuniarily better off than if he did nothing at all. Meanwhile, the situation bids fair to remain *in statu quo* until there is created in London a teaching university embody-

[1] Westminster, St. George's, and Charing Cross.

[2] For these figures I am indebted to Dr. William Bulloch, of the London Hospital. Slightly different totals, leading, however, to no different result, are given by the late Sir Henry T. Butlin in a memorandum submitted to the Royal Commission on London University. (*Minutes of Evidence*, p. 274.) The late Sir William H. Allchin estimates (*ibid.*, p. 324) that from 1900 to 1905 an average of 300 men came up to London yearly; from 1905 to 1910, an average of 276.

[3] *Minutes of Royal Commission*, p. 274.

ing in medical education such ideals as would in time discredit and destroy proprietary education.

On a much smaller scale, Edinburgh furnishes another illustration: there medical education is furnished by the university faculty on the one hand, the so-called extra-mural school on the other. These two bodies have long competed for students. I have already briefly described the university faculty as it now stands; the extra-mural school[1] is a loosely organized proprietary affair, under the nominal jurisdiction of the Royal Colleges of Physicians and Surgeons. Not improbably, the competition of the two schools may have been wholesome at a time when international ideals can hardly be said to have existed. The choice between a poor instructor in the university and a good drill-master outside may have been important when the colonial thought he had to go to Edinburgh or nowhere. But as university education in medicine develops, as English and Scotch universities enter a world-wide scientific competition, local animosities and contentions can only lower the standard, and divide resources; for if both the Edinburgh schools now came together under the university, the barren extra-mural drill in anatomy and chemistry would cease to suggest false standards of scientific teaching, and the entire Royal Infirmary might become a university clinical department, in the manning of which local and personal considerations could be sunk. Edinburgh, like London, therefore, proves that where the university relation is absent or not highly developed, unnecessary schools survive on a low or obsolete basis.[2] Assuredly, this contrast is not without significance: where proprietary medical education exists, local schools multiply freely; as the proprietary instinct wanes, schools unite or drop off. Where the university status is definite, local competition ceases entirely without as yet anywhere reducing the number of faculties dangerously low. On the Continent, two apparent exceptions are easily accounted for: at Prag, racial bitterness compels the separate maintenance of two universities, — one, German, the other, Czech; at Lille, religious animosities are similarly perpetuated.

It is unfortunately impossible to show statistically the effect of proprietary edu-

[1] The relations of the extra-mural school and the university can be understood only in the light of their history. In 1694, Alexander Monteath, a member of the Corporation of Surgeons, obtained from the town council permission to use "those bodies which dye in the correction house" to teach anatomy; during the succeeding twenty-five years, other subjects were added. The medical faculty of the university started in 1726 with the right to confer degrees. The two schools grew side by side; it became usual for students dissatisfied with a university teacher to attend classes under extra-mural instructors, though they were not thereby excused from attendance on the university. Early in the nineteenth century, however, the extra-mural school was so much the more popular of the two, that an effort — unsuccessful till 1847 — was made to force the university to recognize and accept extra-mural teaching. The tie between the extra-mural school and the Royal Colleges was snapped in 1871; it has latterly been reëstablished. Nevertheless, the classes offered do not form a school in any proper sense. They are practically private classes, the teacher furnishing the equipment and keeping the fees. The students are in large part university students, candidates for degrees; the remainder expect to obtain qualification for practice by passing the "Triple Board" examination (see page 268). The university allows students to take classes in the extra-mural school, thus recognizing work which it does not control. (See "The Development of the Edinburgh School of Medicine," by Professor D. Noel Paton, *Edinburgh Medical Journal*, November, 1894.)

[2] At Glasgow, two extra-mural drill-schools of proprietary character still survive: Anderson's College Medical School and the Western Medical School.

cation on the size of the student body in general. Evidently, low standards tend to swell enrolment; and the high rate of mortality at the qualifying examinations [1] suggests the inferiority of no small portion of it. But total attendance statistics for a series of years cannot be given. The schools, being largely private enterprises, furnish no detailed information on the subject. Such figures as are published may be misleading. It is important to create the impression of prosperity; therefore, published lists do not always distinguish full from special students: of 500 students claimed by one school, only 380 were full medical students; of 58 entering another, only 31.

Let us, finally, consider the relation between population and number of physicians under partially proprietary conditions. When medical education is proprietary in character, the economic motive alone checks production. Personal fitness and adequate previous training have little influence; for tempting advertisements obscure the former consideration, low entrance standards dispense with the latter. Solicited to enter professional life, the untutored boy asks only, "Will it pay?" And the statistics show that he takes large chances as to that. In 1891, there were in the United Kingdom 29,555 registered physicians for a population of 38,104,975, that is, a ratio of 1 to 1289; in 1898, 35,057 to 40,380,792, or 1 to 1151; in 1907, 39,827 to 44,100,231, or 1 to 1107. London, with a present population of 4,536,541, had 4801 registered physicians, a ratio of 1 to 945; at Birmingham, the present ratio is 1 to 1376; at Newcastle, 1 to 1418. In Scotland, overcrowding is in the large cities pronounced, though it is to be remembered that the consultants of the entire country are concentrated in a few towns: Edinburgh shows a ratio of 1 to 489; Glasgow, 1 to 754. The country districts show no scarcity: omitting 39 towns containing 10,000 or more inhabitants, Yorkshire has one physician for 2057 persons; Devon and Cornwall, less fourteen such towns, one for 1238; Cumberland, less four towns, one for 1882; Warwickshire, less eight, one for 1139. In Scotland, Sutherlandshire has a physician for every 1121 inhabitants; Argyllshire, less two towns, shows the ratio 1 to 799; Fifeshire, less three towns, 1 to 1622; Aberdeenshire, less three, 1 to 1164.[2] Population being denser than in Germany or Austria, inequality between town and country is much less marked, the country itself being so overcrowded that a livelihood is far too precarious: not much over one-half of the profession actually achieve a fair success or better.[3] In general, in the decade 1891–1901, the population of England and Scotland increased about 10 per cent, the medical profession over 20 per cent. Despite the increase in total registration, the average annual registration is now declining. The average annual registration in England during twenty-four years was 674, during the five years preceding 1910, 593; in Scotland, 470 and 434 respectively. This temporary diminution in an overcrowded profession is not alarming. It is probably to

[1] See chapter xi.

[2] Based on Churchill's *Medical Directory*, unofficial but approximately accurate. How many registered physicians have withdrawn from practice, it is impossible to say.

[3] Sprigge, pp. 30-37.

be accounted for by the existence of relatively brighter prospects somewhere else. In any event, it is no sufficient reason for leaving British medical education untouched for fear of imperiling the necessary supply. The statistics of a larger span show clearly that the profession may be counted on to increase; it would be unwise to let it increase without any of the checks that higher entrance standards, higher educational ideals, and fewer schools would supply,—checks that would certainly insure a better profession without imperiling a sufficiently numerous one.

In France medical schools of three types are found: the university faculties, eight in number, situated at Paris, Lyons, Bordeaux, Lille, etc.; so-called schools "de plein exercise," attached to hospitals in three cities,—Marseilles, Nantes, and Rennes, where there are no universities; "preparatory schools," likewise attached to hospitals in twelve non-university towns, such as Angers, Dijon, Rouen, and Amiens, and offering courses covering only two years of the curriculum.[1] In all three types, the government designates the professors; but as, with rare exceptions at Paris and Lyons, appointments go to local men engaged in practice, not even the university faculties are built on university lines. The second and third types differ from the first in their total isolation and in the source of support; for the state finances the universities, the municipalities finance the others,—as far as they are financed at all. Only the universities are empowered to conduct examinations; hence, twice yearly, university professors are delegated to conduct examinations at the inferior institutions. Practically, these inferior establishments are of little importance. Of a total enrolment of 8850 medical students in January, 1911, 7652 were found in university faculties, 557 in schools "de plein exercise," and 570 in the preparatory schools. Paris alone registered 4101, Lyons 968,[2] Bordeaux 732, Montpelier 659, Toulouse 412, Nancy 340, Lille 279, Algiers 161. The non-university school at Marseilles enrolled 256, at Nantes 158, at Rennes 143; of the twelve preparatory schools, Angers, the largest, had 86 students, Besançon, the smallest, 32. The year's output of graduates was 883; Paris furnished 450, Montpelier 120, Nancy 32, Algiers 3.

The relation between the size of the medical professson and the population that it serves, appears to resemble what we have previously encountered elsewhere. The number of registered physicians in the country increased from 14,846 in 1881, to about 20,000 in 1909,—an increase of 30 per cent in a period during which population increased 10 per cent.[3] Locally, conditions repeat those prevailing elsewhere: Paris had

[1] The history of these partial schools is as follows: Prior to the Revolution, there existed in the more important towns of France corporations of surgeons with certain educational functions. On the suppression of these bodies in 1793, the door to the practice of medicine and surgery was left wide open; but the abuses of unrestricted practice soon proved intolerable. By a series of decrees, beginning in 1820, the last as recent as 1894, so-called secondary schools of medicine were established in twelve towns. These schools consist of local hospitals, to which meagre laboratories of physics, chemistry, biology, anatomy, and physiology are joined; their students remain for two or three years, betaking themselves elsewhere for the rest of their work.

[2] Not reckoning about 200 military surgeons.

[3] *Congrès des Practiciens, Avril* 1910, vol. i, p. 249.

one physician to 1126 inhabitants in 1894, one to 931 in 1901, one to 767 in 1908. In general the towns are overcrowded, the thinly peopled departments undersupplied, because they offer no inducements. There are 15,459 physicians outside Paris for a population of 36,488,852 (ratio 1 to 2360). In the department of Ain, 122 doctors for 345,856 (ratio 1 to 2834); in that of Alpes (Basses), 39 for 115,021 (ratio 1 to 2949); in Lozère, 40 for 128,866 (ratio 1 to 3221). In towns, by way of contrast, Marseilles (population 491,161) has 378 doctors (ratio 1 to 1299); Lyons (population 472,114) has 421 (ratio 1 to 1121); Limoges (population 84,121) has 49 (ratio 1 to 1716); Poitiers (population 39,886) has 32 (ratio 1 to 1246).[1]

The foregoing discussion appears to warrant the following conclusions: overcrowding of the profession takes place in Germany and Austria on a high, university basis, in England and Scotland on a low, proprietary basis. It is, indeed, as would be expected, more marked in the latter countries, but its occurrence in all indicates that high standards as such do not mean a depleted profession. Wherever adequate general school facilities have been provided, a high standard of medical education, despite its attendant delay and expense, is entirely consistent with an abundantly, even too abundantly, numerous profession. Low remuneration, doubtful success, excessive competition, do not effectually deter. The danger of depletion cannot, therefore, anywhere be urged against conversion of low standard proprietary education into high standard university education as fast as proper secondary school facilities can be provided. The reason is plain: medicine is at once an interesting and an attractive profession. It offers powerful inducements of scientific and social nature, so powerful that additional educational barriers merely increase both its scientific possibilities and its social distinction. A surplusage may exist, whatever the educational basis. Where education is on a university basis, surplusage is ascribable to the social prestige and scientific interest of the learned professions; where education is on a proprietary basis, a larger surplusage represents in no slight degree the admission of the unfit. Under university conditions, therefore, a supply of higher quality is better adjusted to the demand,—never so closely, however, as to exclude selection of the more capable by wholesome competition. The sacrifice of sound educational principle, and resistance to progress along modern university lines, profit only the individuals interested in private ventures. Nor can proprietary education fairly plead in extenuation any indirect benefit to the state. It leaves society still to deal with the problem of the back country; it lowers the quality of the urban physician, embittering and demoralizing his struggle for existence.

[1] Figures taken from *Guide Rosenwald*, 1910. It must be remembered that midwives, being numerous, diminish the burdens of the profession, as do also the quacks.

CHAPTER III

THE BASIS OF MEDICAL EDUCATION

THREE-FOURTHS of the students beginning the study of medicine at the German university are under twenty-one years of age. There, as elsewhere, the average age has risen, while at the same time the average period of study has lengthened. In the eighteenth century, the student came to the university in his eighteenth year; toward the close of the succeeding century, in his twentieth. At that point the average now remains, with an observable tendency higher: in 1899–1900, 22.2 per cent were over twenty-one; in 1902–1903, 26.83 per cent; in 1905–1906, 26.46 per cent. Meanwhile, the percentage of students entering under nineteen shrank from 26.72 per cent in 1899–1900 to 23.80 per cent in 1905–1906.[1] A few months previously, the student has been graduated from a nine-year secondary school. All pursue that beaten path; it forms the only approach to the medical profession. The intending physician must have completed a regular secondary curriculum; thereupon he must study medicine at a university. On no other terms can he look forward to engaging in the practice of medicine, surgery, or any medical or surgical specialty.[2]

During the whole of the nineteenth century, this path was alike steep and narrow. The recognized *Gymnasium* was a classical school, established in essentially its present form in 1810, when the new conception of the university as an institution for professional training and research necessitated the widespread organization of secondary schools capable of supporting the academic structure. As organized they were decidedly partial affairs, even though called institutions of general culture. Philology in one form or another dominated the curriculum. Unable, therefore, to find adequate expression in the crowded and hostile humanistic *Gymnasium*, the modern side, as it is aptly called in England, procured in 1859 its own establishment, the *Realschule*, subsequently developed into the *Realgymnasium*. A third form, the so-called *Higher Realschule*, — even more explicitly modern and scientific, — was established in 1882. University privileges, however, were limited to the classical *Gymnasium*, which enjoyed an unbroken monopoly during the entire century. Not, of course, without vigorous protest, in which, with characteristic outspokenness, the youthful emperor, William II, dramatically joined on the occasion of a general edu-

[1] *Preuss. Statistik*, 204, pp. 116, etc. See also Lexis: *Deutsche Universitäten*, vol. i, pp. 136, etc.

[2] Excepting only obstetrics: midwives are licensed after special training. The so-called "Personal-Verzeichniss" issued by each university, in enumerating students, sets aside those enrolled in the medical faculty "without certificate of graduation from a gymnasium" ("ohne Reifezeugniss"). These are mere hearers, who cannot come up for examination. They are relatively much rarer in the medical than in the philosophical faculty, as the following figures show:

University	*Semester*	*Hearers in Philosophical Faculty*	*Hearers in Medical Faculty*
Berlin	1908–1909	577	0
Breslau	1909–1910	284	0
Halle	1909–1910	152	32
Marburg	1909–1910	63	38
Kiel	1909	79	0

cational conference assembled shortly after his accession. Bitterly recalling the insufficiency of the education that he had himself received in the classical *Gymnasium* at Cassel, he declared: "I believe I realize to what goal the modern spirit and the century now approaching its close are tending, and in educating the oncoming generation, I am resolved, as I was resolved in taking up social reforms, to travel the new paths which, beyond all question, travel we must." The concessions obtained at the moment were slight; ten years later, however, the emperor was able to issue the rescript[1] that affirmed the equivalence[2] of the three types of secondary school.[3] In this scheme the experience of a decade has disclosed certain defects that I shall mention in passing. But they are far outweighed by its merits; for the scheme recognizes individual diversity and procures both continuity and variety, while avoiding the dangers arising from dispersion and promiscuity.

These three types can be very readily characterized and differentiated. Alike they consist of nine successive classes; all offer practically the same courses in history, religion, German, and geography, some science, and some mathematics. On this common basis, varying but slightly from state to state, the classical *Gymnasium* emphasizes strongly Greek and Latin; the *Realgymnasium*, omitting Greek wholly and relegating Latin to a somewhat inferior position, stresses, particularly in the higher classes, the modern languages and the sciences; the *Higher Realschule*, cutting loose entirely from the ancient languages, throws itself frankly and unreservedly upon modern subjects. The classical *Gymnasium* and the *Higher Realschule* are clean-cut embodiments of mutually exclusive ideals. The *Realgymnasium* is a compromise, retaining part of the humanistic discipline, while embracing modern interests and activities.[4] Between the three, the youth chooses early,—as a rule

[1] Allerhöchster Erlass vom 26 Nov. 1900. It is given as an introduction to Lexis: *Die Reform des höheren Schulwesens in Preussen* (Halle a. S., 1902).

[2] This was, in the first instance, a Prussian, not an imperial reform: it applied to the study of philosophy and law, not of medicine, since the last was left to imperial regulation. As the matter now stands, the study of medicine has been opened to graduates of the three types of secondary school, but students coming from the *Higher Realschule* are required to present evidence of having studied Latin, which is not included in the curriculum of the *Higher Realschule*.

[3] In Austria, the same step was taken only a year ago.

[4] For all nine classes, the different subjects and the total hours of weekly instruction offered are as follows:

HOURS OF INSTRUCTION INCLUDING ALL CLASSES

Subjects	*Gymnasium*	*Realgymnasium*	*Higher Realschule*
Religion	19	19	19
German	26	28	34
Latin	68	49	0
Greek	36	0	0
French	20	29	47
English	0	18	25
History	17	17	18
Geography	9	11	14
Mathematics	34	42	47
Science	18	29	36
Writing	4	4	6
Drawing	8	16	16
Total	259	262	262

in his tenth or eleventh year; the choice once made, little room is left for subsequent movement within the curriculum. The risk attending so early an option has latterly led to still another innovation, the so-called *Reform Gymnasium*, which aims to defer decision by so redistributing subjects that all pupils may have from three to five years of common discipline before reaching the fork in the gymnasial road.[1] The gymnasial course closes with the leaving-examinations, conducted by a commission consisting of the teachers and director of the school and a government representative. With this body, sitting as an examination board, a transcript of the student's record is filed. The candidate then undergoes written examinations that include a German essay, translations from and into whatever languages he has studied, plane geometry, solid geometry, etc. The seriousness of the tests may be gathered from the time allowance: five hours for the German essay, as many for mathematics, three hours for Greek and French, two for Latin. For the oral tests, students appear in groups of ten. They are questioned by their own teachers; but other teachers present, and the inspector, are free to interject questions. The examinations are reputed to be decidedly severe. Yet the classes have been so carefully weeded out year after year that the percentage of failure among candidates for the leaving-certificate is not heavy: 3.16 per cent at the classical *Gymnasium*, 2 per cent at the *Higher Realschule*.[2]

The examinations that thus terminate the secondary school open the university career. The successful youth receives a certificate of maturity (*Reifezeugniss*), which admits without further parley to any university in the land;[3] nor can he become a candidate for university degrees or present himself for examination in medicine unless he has thus entered the university. Historically, the maturity examination originated in the desire to protect the university against unfit students. Nevertheless, it is in theory and practice viewed not as an entrance examination in reference to the uni-

The following illustrations indicate the range of the instruction:

Gymnasium:
Latin: Caesar, Ovid, Vergil, Cicero, Sallust, Livy, Tacitus, Horace; in Bavaria and Saxony, Quintilian, Terence, Plautus, also.
Mathematics: Algebra, Plane and Solid Geometry, Trigonometry.
Science: Botany, Zoölogy, Mineralogy, Elementary Physics, and Chemistry.

Realgymnasium:
Latin: Caesar, Ovid, Curtius or Livy or Cicero, Vergil, Horace,—the two latter limited to simpler extracts.
Mathematics: Algebra, Advanced Plane and Solid Geometry, Advanced Trigonometry, Analytic Geometry.
Science: Experimental Physics and Chemistry.

Higher Realschule:
Mathematics: Higher Algebra, Geometry, Trigonometry, etc., carried further.
Science: Botany, Zoölogy, and Mineralogy, more thoroughly. Advanced Physics and Chemistry, including Organic Chemistry.

For detailed and complete description, see Lexis: *Das Unterrichtswesen im Deutschen Reich*, vol. ii, pp. 99-152 (Berlin, 1904).

[1] According to the Frankfort plan, the three lowest classes are in common; at Hanover and Breslau, five. The question is fully discussed by Dr. Karl Reinhardt in *Die Reform des höheren Schulwesens in Preussen* (chapter xx).

[2] These figures have been courteously furnished by Geheimrat Reinhardt. It is to be remarked that many pupils enter the *Gymnasium* with no intention of remaining beyond "Untersecunda," successful completion of which reduces military service to one year. These students are in no wise to be reckoned as failures.

[3] This certificate is deposited with the university, where it remains as long as the student is in residence.

versity, but as a leaving-examination in reference to the secondary school. Secondary school teachers—the boy's own teachers at that—are, under supervision, the responsible agents in the transaction. It is presumed that if the student is fit to leave the secondary school, he is by that same token fit to enter the university: and of the former fitness, which implies the latter, his teachers in the gymnasium are the proper judges. The definiteness and uniformity of school values renders this arrangement safe and convenient. Under its working, the universities are spared the necessity of "going back of the returns;" the *Reifezeugniss*, or leaving-certificate, circulates at face value throughout the empire; and students move without let, hindrance, or discount from one institution to another.[1]

In the decade that has passed since the breaking of the gymnasial monopoly, *Realschulen* have greatly increased. In 1900, there were in Prussia 295 *Gymnasien* as against 135 *Realgymnasien* and *Higher Realschulen;* in 1909, 336 *Gymnasien*, 138 *Realgymnasien*, and 85 *Higher Realschulen*.[2] While the classical *Gymnasien* have increased 14 per cent, the scientific secondary schools have increased 66 per cent.[3] The total attendance in the same period was as follows:[4]

ENROLMENT

Year	*Classical Gymnasien*	*Realgymnasien*	*Higher Realschulen*
1890	77,811	26,272	4,177
1900	89,257 (increase 14%)	21,433	15,134 (increase 20%)
1909	106,794 (increase 19%)	46,080	34,735 (increase 129%)

The output in graduates:

Year	*Classical Gymnasien*	*Realgymnasien*	*Higher Realschulen*
1890	3,657	539	18
1900	4,646	709	1,315
1909	5,735	1,243	1,885

The relative importance of the humanistic *Gymnasium* is thus gradually declining. In 1900, 59 per cent of all Prussian boys in secondary schools were studying in the classical schools, as against 14 per cent in *Realgymnasien*, and 27 per cent in *Higher Realschulen* and *Realschulen;* a decade later, the percentages run 48, 21, and 31, respectively.[5] The inherent affinity of medicine for the scientific secondary schooling

[1] For a concise account of the leaving-examination and a summary of what is to be said for and against it, see Loos: *Handbuch der Erziehungskunde*, vol. ii, p. 17 (Vienna, 1908).

[2] Each type also has a shorter form found in smaller communities,—the *Progymnasium*, *Realprogymnasium*, and *Realschule*, respectively, each offering six years' work leading up to the seventh in the complete school of its own type. The increase of the secondary pro-schools is reflected in the following figures:

Year	*Progymnasien*	*Realprogymnasien*	*Realschulen*
1900	50	23	132
1909	35	45	169

[3] In the same period population has increased 16 per cent, showing that gymnasial education is penetrating the people more deeply.

[4] *Die Reform des höheren Schulwesens in Preussen*, pp. 411-416.

[5] A. Tilmann: *Monatschrift für höhere Schulen*, June, 1910, p. 298. The same article contains a highly interesting account of the cost of keeping up the secondary school system of Prussia. It appears that

is gradually affecting the student's option. The following tables depict the progress of the movement:

Semester (S, Summer; W, Winter)	Total Matriculation in Medical Faculty	From Classical Gymnasien	From Real-gymnasien	From Higher Realschulen
1908 (s)	2,786	2,379 (85.3%)	320 (11.5%)	87 (3.2%)
1909 (s)	3,669	2,877 (78.4%)	589 (16.1%)	203 (5.5%)
1910–1911 (w)	3,873	3,057 (78.9%)	597 (15.4%)	219 (5.7%)

Of students in their first semester:

Semester	Total	Classical Gymnasien	Realgymnasien	Higher Realschulen
1910	453	325	86	42

The explanation of the foregoing figures is not far to seek. Only during the last few years have the secondary schools been graduating the students who entered since the breaking of the classical monopoly. In this brief space of time, the contribution to the student body in medicine from the scientific gymnasia has risen from 14.7 per cent to 21.1 per cent. In considering these figures, two facts must be borne in mind: general culture, not special fitness, is still supposed to be the proper equipment for any sort of university career; whatever special knowledge may be needed the trained mind readily picks up. This view is—as we shall see—an error, but an error not yet clearly exposed. Besides, the humanistic tradition is strong in the educated classes; and the educated classes form a fairly well-defined caste. One-third of the entire student enrolment of the universities comes from official and professional ranks; the fathers of one-fourth were themselves university students with humanistic training, of course.[1] Although the total number of university students has greatly increased, only a

the total cost of the establishment increased from 48,419,000 marks in 1901 to 73,740,000 marks in 1910, that is, 52 per cent. The sources whence these sums (millions of marks) are derived are thus shown:

Year	Total	Fees	Endowments	Municipal Taxation	Contributed by State
1901	48½	19	3	14	12
1910	73¾	31	4	24	14

[1] *Preuss. Statistik: Tabellen*, p. 34, etc. Eulenburg: *Frequenz*, pp. 258, etc. The appended tables show the developments, including all faculties:

All Prussian Universities

Semester	Total Matriculation	From Classical Gymnasien	Per cent	From Real Gymnasien	Per cent	From Higher Realschulen	Per cent
1901–1902 (w)	1173	1143	97.5	30	2.5		
1902 (s)	1093	1028	94.	65	6.		
1902–1903 (w)	2318	2230	96.2	88	3.8		
1903 (s)	2103	1995	94.9	108	5.1		
1903–1904 (w)	2131	1983	93.	148	7.		
1904 (s)	2082	1920	92.2	162	7.8		
1904–1905 (w)	1950	1775	91.	175	9.		
1905 (s)	2117	1923	90.8	194	9.2		
1905–1906 (w)	2017	1808	89.6	209	10.4		
1906 (s)	2175	1934	88.9	241	11.1		
1906–1907 (w)	2324	2075	89.3	249	10.7		
1907 (s)	2534	2216	87.5	264	10.4	54	2.1
1907–1908 (w)	2643	2289	86.6	291	11.	63	2.4
1908 (s)	2786	2379	85.3	320	11.5	87	3.2
1908–1909 (w)	3072	2546	82.9	407	13.2	119	3.9
1909 (s)	3286	2691	81.9	442	13.4	153	4.7
1909–1910 (w)	3536	2832	80.1	535	15.1	169	4.8
1910 (s)	3669	2877	78.4	589	16.1	203	5.5

negligible fraction of the increment has been derived from the lower strata of society. In truth, Germany is, and is purposely kept, an aristocratic country; and an obsolescent education is one way of hedging an aristocracy about. Transit from popular and technical schools into the *Gymnasien* which constitute the portals of the university is none too common and none too easy. The stream that would most probably swell the scientific enrolment is thus dammed before it gets so far. Of those whose social position or origin destines them to the university, only the exceptionally vigorous or the unconventional are likely to break abruptly with humanistic tradition. Meanwhile, prosperity is creating another source of university recruits. The rich merchant or manufacturer wants some of his sons to continue his business; but he also wants the family prestige elevated by having a son or two in a profession. The more downright follow inclination by approaching the university through the modern side of the gymnasium; those who are sensitive to the social value of humanistic association go to the classical gymnasium, thus marrying into the educational aristocracy.[1]

As to the comparative value to the prospective medical student of the three secondary disciplines respectively, there is in Germany even now nothing like unanimity of opinion, although the modern trend appears to be steadily gaining. At the very beginning of the movement in favor of modern studies, the urgent needs of medical education were made prominent; but when, in 1869, the Prussian ministry took counsel, the medical faculties were almost evenly divided in opinion. The faculties of Berlin, Breslau, and Halle were squarely against a new departure; that of Bonn refused to take a stand, for the professors were unwilling to abandon the classical discipline, even while they admitted that "science teaching in the *Gymnasien* was shamefully neglected." Göttingen, Kiel, Königsberg, and Greifswald were favorable to the modern order. In the conference of 1890, even Helmholtz argued in behalf of the superior disciplinary efficacy of the ancient languages, especially Greek, although he is nowadays cited by Ostwald as a brilliant illustration of their futility;[2] for as he himself confessed in the remarkable address delivered at the celebration of his seventieth birthday: "Many a time while the class read Cicero or Virgil, both of which greatly bored me, I was calculating the path of parallel rays through a telescope under my desk." As recently as November, 1909, a conference at Munich was still discussing the question: "What secondary school training is most desirable for the study of medicine?"[3]

NON-PRUSSIAN UNIVERSITIES

Semester	*No.*	*Total Matriculation*	*Classical Gymnasium*	*Per cent*	*Real-gymnasium*	*Per cent*	*Higher Realschule*	*Per cent*
1907–1908 (w)	7	1896	1566	82.6	297	15.7	33	1.7
1908 (s)	8	2546	2061	80.9	407	16.	78	3.1
1908–1909 (w)	11	4583	3801	82.9	654	14.3	128	2.8

(The above figures are taken from the *Monatschrift für höhere Schulen* — passim.)

[1] The classics are held to be "vornehmer."

[2] *Grosse Männer*, p. 344 (Leipzig, 1910).

[3] Full proceedings are given in the *Münchener Medizinische Wochenshrift*, 1910, No. 19.

Grave differences of opinion exist in Germany, as elsewhere, respecting the method to be employed in settling such problems. The breaking of the monopoly of the classical gymnasium was not itself necessarily a final solution; for it yet remains to be decided whether the three possible paths that now lead to the medical curriculum are in fact equally acceptable. How is one to decide?

One may proceed in either of two ways: from the standpoint of abstract educational principle, or from a consideration of the antecedent requirements of the object to be attained. Partisans of the classical basis start from the former. Their argument requires one to concede in advance certain highly debatable propositions as to mental discipline and the peculiar efficacy of the ancient languages in this regard. These propositions appeal with force only to those disposed in advance to grant them. The intrinsic value and interest of the classics are not now in question, — merely their educative importance to those that have no other concern with them. When the problem is thus narrowed, it is hardly too much to affirm that favorable causal relations between the humanistic discipline and subsequent scientific performance cannot be definitely made out. Nor can the argument from abstract principle be successfully buttressed with statistics that prove, at the most, only that many men who have worked through the classical gymnasium have also succeeded in working through the medical faculty. The achievement of brilliant success in science proves the possession of extraordinary ability, not the virtues of a classical education; for extraordinary ability attains its objects, regardless of schoolmasters. Something would be proved for the humanistic cause if it could be established that students of mediocre capacity from the classical schools do better in medicine than students of mediocre ability from the *Realschulen*, for mediocrity can noticeably be helped by propitious, and hindered by unpropitious, surroundings. But on this point statistics throw no light. To mere argumentation the partisan of a more modern procedure, therefore, opposes a stubborn skepticism. The needs and the problems of the medical curriculum stare him in the face. From them he reasons backward.

The current of opinion flows, more strongly than surface appearances indicate, against the classical gymnasium as an acceptable or feasible basis. Reason and history both suggest suspicion. It is indeed the difficulty with customs and institutions, — educational as well as others, — that they maintain in one situation prestige won in quite another. It becomes, therefore, difficult to deal with problems on their merits. Here is a case in point. The classics achieved their prominence under educational conditions and for educational objects wholly unlike the conditions that now obtain in medical education. Would it be anything less than an educational miracle, if a form of training that came into vogue for scholastic purposes proved some centuries later the fittest discipline preliminary to sciences which represent the opposite extreme in content, logical method, and attitude to life, — more fit than any alternative that can now be devised by those battling with the difficulties of a concrete situation? Such educational predestination seems in the highest degree improbable. The grounds on which classical training is now commended have, as a matter of history, nothing to do with the causes that gave that training currency. The classical languages were originally taught largely because they were needed. They had become a habit by the time they ceased to be needed. New reasons had then to be contrived to explain their continued study; these were, of course, readily found: the classics were the only gateway to superior culture; the peculiar structure of the ancient languages made them a potent instrument for the discipline of mental faculty. For a time, the former argument was taken to be the weightier; but it has lost in importance with the growing recognition of the fact that boys acquire little of the ancient culture in the course of their study of ancient languages, and what they do acquire is of dubious adequacy or authenticity. At the moment, the case rests rather on the formal argument: "The gymnasium has done enough even for the future doctor, if it has taught the youth to think logically and has permitted his judgment to harden and ripen."[1] Long strides are lightly taken in such argumentation. To say the least, it has nowhere as yet been proved that, as mere discipline, formal discipline is superior to one that actually takes account of the normal activities of youth or of the object toward which he strives; nor does it follow that it is feasible to organize education thus, even were it true.

The fact is, that the passage from educational principles, so-called, to specific educational content is highly perilous. Principles in education have hitherto been mainly pretentious warrants for doing what the schools propose to do anyway, for some other reason; they have been neither fundamental nor comprehensive. Derived from the imagined virtues of a certain subject-matter, they shortly reappear as its sanctions. A specific content can be inferred from them only because it is their own source. As a matter of fact, such principles as we can hope to establish in secondary education are psychological and social rather than philosophical; they concern presentation rather than content. The problem of education is relatively constant: to assist the individual to organize himself in harmony with his environment and his purposes. Psychology can hope to be distinctly suggestive as to procedure. But the contents of the school plan must change with the changes of the environment and the object: long prescription is a doubtful argument in behalf of any curriculum.

Therefore, in the construction of a course of study for a progressive society or a progressing object in such a society, what may not unfairly be called opportunism must necessarily play a large rôle. Suppose, for example, it were demonstrated that formal discipline is of greatest value and that the Chinese language is the best vehicle for formal discipline: the existence of teachers in plenty being assumed, would it then be feasible or wise to introduce Chinese into the secondary schools? Clearly not; in the choice of the curriculum not only formal ends, but actual content, must be regarded; and the practical educational problem of every age may well be, not to procure the most effective formal discipline, excluding all other considerations, but to

[1] Bickel: *Wie studiert man Medizin?* p. 5 (Stuttgart, 1906).

derive from a content dictated by social conditions the best discipline obtainable. For as modern education is a function of social life widely taken, its subject-matter must bear an unmistakable relation to the interests, activities, and purposes of the age, and of the individual's object and environment. No single principle can then dictate the constituents of a course of study, which must rather recognize and endeavor to harmonize many motives. It includes one thing because it desires to communicate a valuable content, something else in order to test or develop a particular capability, and still another thing by way of furnishing a tool that may contribute in one case to enjoyment and in another to profit. The secondary school curriculum is necessarily a compromise of this complicated character; it can, therefore, accommodate any congenial and helpful subject that, viewed from an opportunistic standpoint, is of value, — whatever else it may contain and for whatever reason.

The classic languages thus undoubtedly obtain a place in the secondary school for such as choose to pursue them, — in which respect they are on the same footing as most other subjects. The central branches of a course of study may, however, also fairly be dictated by the goal that the student hopes to reach. He may not at the moment himself choose to study chemistry, even though he knows he will ultimately study medicine: he may prefer something more decorative. In that case, his eventual object must at the proper time retroactively overrule his personal preference. In choosing the end, he must submit to the means involved in it. Now and then, of course, the student's instinctive choice will anticipate just such prescription; he will want to do betimes the very things that his ultimate purpose would, if consulted, suggest: self-expression and life-object neatly coincide. A Helmholtz or a Faraday thus unerringly defines his object in life by a dominant trait; his entire spiritual and intellectual life orders itself spontaneously around a single burning focus. But the less highly and energetically organized individuals, of whom for the most part the world is composed, select their objects more or less adventitiously, and remain, perhaps, permanently in doubt as to just what use they would make of an unrestricted opportunity for self-development, should they get it. For the genius at white heat, guidance comes from within; for the rest, some sort of control must be exercised from without. How these various aims and needs are to be recognized in secondary education is a problem in adjustment not to be solved on the basis of abstract principle.

The growing preference for the scientific secondary training corresponds with increasing acknowledgment of the urgent necessity of consulting the ultimate object for guidance in this matter. Abstract educational principles cannot alone or chiefly determine. We must analyze the situation of the medical student, we must analyze the medical curriculum, and thereupon, with full knowledge, decide how the difficulties that are discovered are to be met.

The main difficulties are these: the age of entrance upon the study of medicine is rising, — economically and educationally a distinct misfortune. To make things worse, the curriculum has steadily expanded. Despite increased length, it is still packed to the bursting point, as mere enumeration of its contents will prove. The student must now get, wholly within the university if classically trained, physics, chemistry, biology, anatomy, physiology, pharmacology, bacteriology, pathology, hygiene, medicine, surgery, gynecology, obstetrics, pediatrics, etc. The task, however modestly conceived, is practically impossible. But if the learning of physics, chemistry, and biology were remanded to the secondary school, congestion would be to that extent relieved, and the more thorough training thus procurable would also elevate the grade of work in the medical sciences.

This, then, is the procedure suggested by a study of the object. With the increasing volume of things to be learned, the professional motive must become operative farther back. At a time when medical lore could be comfortably disposed of in the course of eight or ten semesters, it was all very well to postpone decisions and beginnings until the university was reached; but a reasonable acquaintance with the field now requires both an earlier start and a more prolonged endeavor.

The prudential argument just presented is strongly reinforced by pedagogical considerations. Youth is plastic, suggestible, energetic. Prolongation of an unrelated schooling confiscates its years of promise and enthusiasm. Now that medical study is specific in its demands, as to the type, training, and information required, the secondary school is in position to take time by the forelock. We know in advance what instruments the student will need to have mastered: modern languages, for example, which, by the way, he learns best if he learns early and informally; manual dexterity, not to be acquired after the muscles have "set;" keen sense perception, lost unless engaged and fixed in childhood and youth. The eye that is not early trained to detect slight differences, the ear that is not early habituated to distinguish sounds, the hand that is not early accustomed to skilful evolutions, lose once for all their educative potentiality.

The same is probably true of the inductive habit. Medicine is not an exact science: it is none the less inductive and experimental. The fact that its data are so complex, that it deals usually with probabilities rather than with certainties, does not destroy its scientific character; it only adds a reason for greater scientific caution. Every point that the physician observes is to him a suggestion; he looks for other indications whose presence will confirm his tentative diagnosis, or he tries a certain procedure, the outcome of which will decide whether he has read the situation aright. The shuttle-like movement of mental process from observation of the patient forward to inference or trial and then back to the patient again is a habit to be developed in childhood and youth. The robust scientific temperament may be somewhat indifferent as to what opportunity the schools give for its cultivation: unpropitiously placed, it may, without being permanently injured, prove recalcitrant like Davy, or successfully divide attention like Helmholtz. But in case of less gifted individuals, the chances to determine the inductive mental habit that the school neglects, subsequent life very rarely indeed recovers.

No opportunities afforded at the university for the study of chemistry, physics, mathematics, or biology retrieve what the gymnasium loses. In the first place, there is no time.[1] The capacities themselves have been blunted from disuse.[2] In consequence, the sciences are not thoroughly acquired even in an elementary form. "To my most ghastly experiences as a teacher," says a distinguished clinician,[3] "belong the hours in which, in order to make a sugar determination, I must train my students to use a polarization apparatus and to read off the result on a scale. Scarcely one in ten can properly carry out the operation. That as late as the final examinations medical students habitually confound a polarizer with a spectroscope may be incidentally mentioned." The content and the level of medical education are thus seriously prejudiced: "The preparation of our students leaves, alas, much to be desired, and precious time must be wasted in teaching the medical student to use his senses; to comprehend what he perceives and properly to manipulate it in thought. But that is the foundation of medicine; the student cannot practise observation and inference early enough or often enough."[4] The defect is increasingly felt, not because the gymnasial teaching has deteriorated, but because medical study has become increasingly definite and increasingly severe in its demands. Students as competent in observation now as their predecessors twenty years ago appear relatively inferior. That, on the other hand, brilliant successes can be instanced proves little. One may possibly succeed in spite of education quite as well as because of it. The factors that determine a successful educational outcome are so complex that it is impossible to determine the precise share of a particular part of the curriculum in the result, however prominent. The mere fact that all hitherto successful men were classically trained does not prove that a humanistic foundation is either a wise or a necessary preliminary. It is precisely because no headway can be made in this direction that it is important to obtain from the end to be reached pertinent suggestions as to the path to be chosen in order to reach it.

From time to time, the combination gymnasium already referred to has been urged as the proper solution. But it seems clear that sound scientific training and thorough humanistic training cannot be accommodated within the limits of a single curriculum, even though it be nine years long. The centre of gravity must lie within the one or the other, — humanities or science; it cannot lie in both. The scientific instruction of the classical schools is destined to remain dilettante, — an incidental exercise to awaken or to satisfy curiosity, or to furnish the child with a superficial training that

[1] "It is a gross mistake, unfortunately very widespread, to believe that there is time enough to acquire this preparation at the university," etc. A. Nagel: *Die Vorbildung zum med. Studium*, pp. 5, etc. (Tübingen, 1890).

[2] "It is a fact that nowadays these capacities are quite inadequately developed in the average student. The science teachers generally and vigorously complain of the awkwardness of the beginner." E. Bernheim: *Der Universitäts-Unterricht*, p. 5 (Berlin, 1898).

[3] F. von Müller: *Münchener Medizinische Wochenschrift*, 1910, No. 19.

[4] J. Orth: *Medizinische Unterricht und Aertzliche Praxis*, pp. 22, 23 (Wiesbaden, 1898).

may lend interest to a vacation trip.[1] In the same fashion, the modern gymnasium must accept its inevitable limitations. Neither form of secondary school has thus far recognized this fact. Hence all gymnasial programs are criticized as at once too various and too arbitrary; they are censured as containing too many subjects and as taking too little account of psychological motive. A reform urged with great force at a recent gathering in Munich[2] proposes that the curricula be so simplified that each will embody an optional major group, to which a required minor group will be compulsorily attached.

It is, however, an error to suppose that the content of the curriculum is the only important consideration. For the most aptly selected and most skilfully dovetailed course of study does not automatically produce trained minds. Good teaching is of supreme importance; inefficient teaching will spoil the most cleverly constructed curriculum. The German gymnasial teacher is a trained expert in the art. In this respect the humanistic instructor has thus far had the advantage; for him a method has been worked out through lengthy experience. The science teachers are just beginning to define their objects and to elaborate an appropriate procedure; their early efforts suffered from excessive extension, and from attaching too great importance to facts, too little to logical process and technical method. Despite the breaking of the humanistic monopoly a decade ago, the numbers who have preferred the scientific basis are so small that for practical purposes medical education in Germany may be said to have rested thus far on the basis of a classical secondary education. Undoubtedly, the narrowness and inelasticity of this prescription have, as I have urged, involved hardship, just as the total inelasticity and the overcrowding of each of the three gymnasial types still do. But at the same time, definiteness of curriculum and vigor of teaching have had advantages that must not be lost sight of. The German student of medicine, for the most part, has known no science at the start; he has been accustomed to alien modes of thought and application. But to thought and application he has at any rate been no stranger. While it would doubtless have been better had the hard work been of a kind to select, to preserve, and to train the peculiar aptitudes henceforth to be relied on, hard work of any kind is at once a sieve and a discipline: it eliminates the incapable,—even though some of those eliminated may have been only philologically incapable; it hardens the fibre of those that remain. Successful passage through the classical gymnasium is, at least, a demonstration of application and power. Like a stern upbringing, the rigidity of the gymnasium has not been an unmixed advantage; but like a stern upbringing, it has been at once formative and selective. It may be inelastic, severe, unsympathetic, and, so far, destructive; but it is also energetic and serious, and, so far, genuinely stimulating. All kinds of gymnasia are alike in this

[1] "Many view instruction of this kind as an agreeable entertainment that introduces a little variety into the monotony of language teaching." J. Pagel: *Einführung in das Studium der Medicin*, p. 56 (Berlin, 1899).

[2] *Aufgabe und Gestaltung der höheren Schulen* (München, 1910).

important respect. The matriculation basis has been broadened, but it has remained qualitatively homogeneous, — homogeneous in respect to the solidity of acquirement and the continuity of effort represented.[1]

In striking contrast with organized and systematized Germany are the conditions surrounding secondary education in England. The national tradition is one of rampant individualism; as against it the national need of effective educational development and organization has been increasingly felt in recent years. Up to our own times, tradition effectively checkmated need. The earliest voice in protest was that of Matthew Arnold, but it was a voice crying out in the wilderness. Successive commissions in 1861, in 1864, and in 1894, had in vain pointed out the fact that elementary education in England was chaotic, and secondary education practically non-existent. The Englishman, fond of doing as he pleased and willing to pay for the privilege, heeded not. Endowment had planted a school here, religious zeal had established one there, business enterprise somewhere else; each went its own way. The endowments were largely wasted; schools conducted by religious organizations or private individuals without central direction or control were for the most part weak and inefficient. After a fashion, work of secondary grade was carried on by universities and university colleges, for which expert "grinding" by tutors or special schools was a sufficient preparation. The conception of secondary education as at once a step beyond the elementary school and the threshhold of the university and professional school has not been widely entertained until very recently. Despite the efforts of a few reformers to gain for the state a firm foothold and a definite function in that field, little positive progress was made until 1902, when local authorities were constituted for the express purpose of establishing secondary schools, and a special division of the national Board of Education, commanding sufficient funds, was created

[1] Austrian conditions, while not so highly developed, are from the standpoint of educational attitude so similar that they require no additional discussion. The monopoly of the classical *Gymnasium* lasted in Austria until 1910; the *Realschule* has very slowly developed to full gymnasial stature. The *Realgymnasium* has a program of only four classes.

NUMBER OF AUSTRIAN SECONDARY SCHOOLS

Year	*Gymnasium*	*Realschule*
1863	92	38
1873	95	74
1883	136	79
1893	156	77
1903	217	121
1906	227	131

The enrolment has been as follows:

Year	*Gymnasium*	*Realschule*
1863	29,748	9,087
1873	31,473	18,339
1883	55,247	16,910
1893	56,581	22,933
1903	78,250	42,262
1906	87,412	45,217

Loos: *Handbuch der Erziehungskunde* (article "Realschule"). The *Gymnasium* and the *Oberrealschule* have each eight classes. For the curriculum of, and the privileges attached to, different certificates of graduation, see Horn: *Das höhere Schulwesen der Staaten Europas*, pp. 101-107 (Berlin, 1907).

to coöperate with them.[1] The terms upon which the contribution of the government is made available tend indirectly to determine the type and scope of the school. They include at this date freedom from denominational control, accessibility through the offer of a stipulated number of free places to all classes of people,[2] a four-year curriculum,[3] and governmental inspection. The course of study must include English, geography, history, mathematics, science, drawing, and one language other than English. Development, though brief, has been rapid: since 1904, when the regulations were revised and accurate statistics became procurable for the first time, the number of approved secondary schools has increased from 491 to 802, the number of pupils under instruction from 85,358 to 135,776; the government subvention, £200,591 in 1904, has been much more than doubled.[4] So quick and recent a growth cannot be of the same texture throughout; teachers and equipment can be provided but slowly. But, whatever may be its present defects, the nation would appear to have at last decided in favor of the creation of an adequate national system of secondary schools.

From the standpoint of correlation with university or professional school, little progress has as yet been made. Oxford and Cambridge are still of overshadowing magnitude; and Oxford and Cambridge show slight inclination to take position with reference to a national scheme for secondary or academic education. Nor do the provincial universities as yet regard the secondary school as the necessary basis of such academic training as lies beyond it; on the contrary, each of the several higher classes of the secondary school is a step-off from which the student may gain academic footing at one higher institution or another, for the universities uphold no common matriculation standard.[5] A school whose sixth form admits to Oxford announces that its fifth form prepares for Birmingham or Durham. The universities themselves—even those situated in large cities—compete with the secondary schools by conducting elementary classes for matriculation.[6] That a modern university seeking to develop

[1] A succinct sketch of the entire development is given in the *Report of the Board of Education for* 1908–1909, pp. 31-46 (London, Eyre & Spottiswoode, 1910).

[2] On January 31, 1911, free places to the extent of 34 per cent were held by pupils from public elementary schools.

[3] In small towns and country districts, a three-year curriculum is permissive for pupils who do not leave school before they are fifteen years of age.

[4] NUMBER OF SECONDARY SCHOOLS IN ENGLAND, ETC.

Year	*Number of Secondary Schools on Grant List*	*Number of Pupils*	*Amount of Grant*
1904–1905	491	85,358	£200,591
1905–1906	600	105,034	225,080
1906–1907	677	115,744	324,334
1907-1908	739	124,758	450,347
1908–1909	804	135,671	537,375
1909–1910 *	841	141,149	573,026

* Figures subject to correction.

[5] The four northern English universities, Liverpool, Leeds, Manchester, and Sheffield, operate a joint matriculation board.

[6] See *Calendar of Victoria University, Manchester*, 1910–1911, p. 213, for "Matriculation Time Table." So at the University of Sheffield, matriculation courses of a very elementary character are offered,

research at the upper end should still be teaching the A B C of Latin and algebra at the lower is not yet perceived to be altogether anomalous.

For the present, therefore, entrance upon medical education in England cannot be located at a definite point in an orderly and progressive educational scheme; for between the secondary school system and the medical school — whether of hospital or university type — there is no educational relationship whatever. In Germany, as we learned, the situation is characterized once for all when one says that the leaving-certificate of a nine year school is the *sine qua non* for matriculation; there is no doubt as to just what that leaving-certificate signifies in knowledge and training. In default of an organized system in reference to which the standard can be fixed, the English prerequisite is defined in the form of certain specifications, to judge which various bodies are competent. Before he is admitted to a medical school, an English boy must at least produce a certificate showing successful examination by one of the bodies in question in four subjects — three being languages: English, including dictation, composition, parsing,[1] and so on; Latin, requiring the study of Caesar and some Virgil, as well as a limited experience in reading at sight;[2] mathematics, including arithmetic, elementary algebra, and three books of plane geometry; and one more language, — Greek, French, German, or Italian, — the scope being approximately that indicated by the prescription in Latin.

In Great Britain, the arrangements with respect to the conduct of these examinations are somewhat complex. One cannot fully understand them without first knowing the method by which physicians are licensed to practise. This subject will be dealt with fully in a subsequent chapter, which I must at this point briefly anticipate. As will there be explained more fully, examinations for the practice-license in Great Britain are held by certain chartered professional corporations and by universities with medical departments: The Royal Colleges of Physicians and Surgeons existing in London, Edinburgh, Glasgow, Dublin, and the Apothecary Societies of London and Dublin, are among the professional corporations to which the government has delegated the privilege of "qualifying" physicians. These bodies admit candidates after successful examination to degrees, if they be universities, to diplomas, if they be professional associations; such degree or such diploma constitutes "qualification" or warrant to practise. The charters of these institutions contain no limitations whatsoever as to the educational basis on, or professional quality of the examinations by, which they are to confer the right to practise medicine. The government has divested itself of control without exacting conditions as to how control shall be

as, for example, in Latin, Caesar, *Bell. Gall.*, Book I: in English, Addison, Selections from *Spectator*, Southey, *Life of Nelson;* in mathematics, algebra to progressions, etc.

[1] The source of the selection to be parsed is at times indicated; it is usually a poem like Goldsmith's *Deserted Village.*

[2] The University of London and the Conjoint Board do not require Latin; they accept instead, in case of Oriental students whose vernacular is other than English, examination in either science or a classical Oriental tongue.

exercised by those to whom it is delegated. It has presumed that bodies within the profession will be sufficiently jealous of their prestige and their interests to protect honor, dignity, and credit.

This expectation has not been wholly fulfilled. Intolerable discrepancy in point of ideal among the examining corporations came to light coincidently with the general rise of medical art. While the government was not even thus led to make itself directly responsible for the character and fitness of those at whose mercy the health and well-being of the citizen largely lie, society has nevertheless recoiled from some consequences of the individualistic attitude. Control of a kind has somewhat unexpectedly issued. A man may, if he chooses to take the consequences, employ an outright quack; but as the state has commissioned certain organizations to distinguish between doctors and quacks, the citizen ought at least to be so far protected that, whichever he prefers, he may be certain of getting what he pays for. In order, then, that the public may be in a position to distinguish between properly qualified and unqualified practitioners of medicine, the General Medical Council[1] was established by statute in 1858. This body, consisting of representatives of the various examining bodies, of the Crown, and of the profession at large,—in effect, therefore, representative of the medical profession as constituted at the moment,—was charged with the duty of registering all properly qualified physicians, and annually printing an authoritative list thereof. So far the Council possesses no option whatsoever; it is bound to register any applicant who presents a medical diploma from a university or a certificate of admission to membership in any body authorized to license practitioners of medicine and surgery. While the Council thus far enjoys no discretion, it was fortunately authorized to inspect the examinations of the various organizations above named; and it was required to protest against examinations that were in its judgment "insufficient,"—in the first instance, to the examining body itself; to the privy council, in case the body complained of took no action. The privy council might do one of many things: it might, for instance, close an offending school, or disallow the offending examinations. The right to inspect and comment upon examinations has been skilfully cultivated, until the General Medical Council has now taken the ground that it will stamp as insufficient any examination that does not include a specified list of subjects, by which interpretation it has practically won the opportunity to dictate the minimum acceptable curriculum.[2] What is more to our present purpose, the same species of tactics enables it now to hold that no examination is sufficient unless the curriculum in question presupposes the minimum general education specified above. The examining bodies in whose hands legal power resides had indeed already started this movement when the General Medical Council took it up. For years the Council has been systematically engaged in bringing about an agreement between the various licensing boards as to a uniform minimum of general education, and it has done much to make

[1] For fuller account, see chapter xi on Examinations and chapter xiii on Quacks.

[2] See chapter xi.

this uniform minimum a reality. An endeavor, however, to gain complete control has thus far been balked. The Council has therefore never been able to exclude all variations. It has proposed, for example, that all medical students should be required to register with the Council before beginning their medical education as well as after obtaining the qualification. Such centralization would doubtless ultimately result in wiping out the divergences from the recommendations of the Council that are still permitted by some of the qualifying bodies. For, be it always remembered, though now everywhere recognized as reasonable, the minimum basis set forth by the Council is not legally binding, and no serious objection is made when an alternative or equivalent of substantially the same value is accepted. For instance, the Council specifies Latin as a subject that should be compulsory; the Conjoint Board of London continues to leave it optional. The Council was long of the opinion that the preliminary sciences—physics, chemistry, and biology—should form part of the medical curriculum; the Conjoint Board meanwhile qualified candidates who presented certificates in all or part of those subjects from certain secondary schools. The Council sets its face strongly against entrance examinations conducted by the qualifying professional corporations; its opposition is soundly based on the obvious unfitness of medical bodies to conduct examinations in, or to pass upon questions pertaining to, general education. The laxity of their action in this matter is sufficiently clear from the fact that, whereas at the College of Preceptors 6774 candidates examined between 1887 and 1891 show 66.5 per cent of failures, 3616 candidates examined at the same period by the Apothecaries' Society of London show only 23 per cent of failures.[1] In response to the pressure of opinion, all the licensing bodies, except the Conjoint Board of the Royal Colleges at Dublin, have now abandoned their examinations in general education. But apparently not beyond all possibility of resumption.[2]

As the matter now stands, a minimum preliminary standard gradually acquiring the force of law has been set up in indirect fashion. The right to issue the requisite certificate of proficiency has practically passed from licensing bodies to the universities, and to various boards and corporations established for the sole purpose of holding examinations and certifying to their results. No medical school conducts an examination in general education, or even passes upon the adequacy of such education.[3]

[1] *Report of the Educational Committee of the General Medical Council*, November, 1892, pp. 14, 15.

[2] A recent address, May 25, 1909, of the president contains the following significant paragraph: "The Board of the Apothecaries' Hall of Dublin have informed the Registrar that they have determined to postpone until July 1 the resumption of their 'Preliminary Examination in Education,' concerning which the Council, on the recommendation of the Education Committee, expressed a strongly adverse opinion at its last meeting. The Executive Committee will report on the reply to this intimation which they deemed it their duty to forward to the Board. At a time when two newly constituted teaching Universities, each with its own Preliminary Examinations, are in process of organization in Ireland, it is difficult to perceive that any advantage to medical culture can arise from the proposed incursion of the Apothecaries' Hall into the sphere of general secondary education and examination."

[3] The situation in Scotland is distinctly more orderly. Since the early nineties, the four Scotch universities have maintained a joint board in charge of their preliminary examinations, Arts and Sciences preliminaries constituting one group, Medical preliminaries constituting another. Moreover, the Scottish Education Department has latterly instituted leaving-examinations of uniform character throughout

Quite aside from the question as to whether the standard is high or low, its determination by external examination is a point well worth dwelling upon. In Germany, we observed that the existence of an organized educational system enabled the university to accept students on the basis of a completed secondary education, of which the secondary teachers were themselves sole judges. Chaotic secondary conditions in England compel the universities to sift applications by means of written examinations which they themselves conduct; and as some measure and evidence of educational achievement are convenient for other purposes than entering the universities, additional agencies have been set up for the sole purpose of examining candidates and conferring appropriate certificates. An unhappy divorce has thus been effected between examining and teaching. Examining agencies such as the University of London, the College of Preceptors, the Educational Institute of Scotland, do not concern themselves as to how the student has procured the preparation, on the adequacy of which they deem themselves competent to pass. Of the teaching that has preceded the examination they know nothing. The examining bodies do not deal with institutions, with schools as organized establishments of certain types: they deal only with individuals, whose positive acquisitions they undertake to gauge. To examinations of this external type the English are generally addicted. Examination is a national industry, getting examined a national habit. Nor does it stop with secondary education. With rather more rigid logic than is usually characteristic of the nation, a further step has been taken: if, quite regardless of how the secondary work was covered, an external examination is capable of determining its adequacy, why cannot a still higher examination award academic degrees in the same fashion? If coaching and tutors can dispense with the secondary school, why not with the college and the university? The University of London, an examining body competent to award all degrees, is thus the logical outcome of the national predilection for examining and being examined. So much is to be said for this trait: it gives unusual individuals a chance to work out their destiny in their own way. But the fallacy lies here: because an extraordinary person will somehow find himself, it does not follow that effective drilling and cramming on a large scale according to the letter of stipulated requirements is a fair substitute for the life and integrity of educational institutions. The examination may indeed disclose whether or not an individual knows this or that, whether he can reproduce this or that; but taken alone, it cannot interpret to outsiders how well he has been educated. Unspeakable mischief has thus been wrought, for the English teacher, constrained by the written external examination, dare not, to quote Sir William Ramsay, train his boys "to do something instead of to know something."[1]

Scotland. These examinations are so designed as to avoid interference with the liberty of the teacher, while at the same time acting as a control. The so-called intermediate certificate corresponds closely in value to the preliminary medical examination of the universities; the leaving-certificate proper corresponds to the Arts and Science preliminary examination of the universities. See J. Kerr: *Scottish Education* (Cambridge University Press, 1910), and *Report on Secondary Education, Scotland*, 1910, by Sir John Struthers (London, 1910).

[1] Appendix to *First Report, Royal Commission on University Education in London*, p. 166 (London, 1910).

The General Medical Council and the various qualifying bodies publish lists of acceptable examinations. They include the arts or science degrees of all universities; junior, senior, and higher local examinations of Oxford and Cambridge; the matriculation examinations of all universities; leaving and intermediate certificates issued by the Scotch Education Department, and credentials issued by the College of Preceptors,[1] London, the Educational Institute of Scotland, and some twenty-five other examinations held outside the United Kingdom. The range is decidedly extensive: the student may begin the study of medicine from the vantage-ground of the arts or science degree, or at the level of university matriculation, or at a level distinctly below that at which a university would admit him as candidate for its arts diploma; and, as we shall see, students of all these discrepant levels are found side by side in all medical schools.

On the principle that, given several alternatives, the permissive minimum is the actual standard, the basis of English medical education, while definite, is indisputably low. It comprises four subjects, all of elementary grade, three of them languages. The passing mark is less than 40 per cent. This scholastic requirement can be readily met by a fairly well-taught boy of average intelligence at fifteen years of age. On these entrance terms, the qualification to practise is obtainable through any of the several professional corporations,—the Royal Colleges or the Apothecaries' Halls. Moreover, it is difficult to determine how uniform in value even this low minimum is. The special medical student certificates issued by the College of Preceptors and the Educational Institute of Scotland have been regarded with suspicion for some time. Students presenting them are required to have taken all four subjects at one sitting; when a recent recommendation of the Education Committee of the General Medical Council becomes effective, the five weakest of the accepted examinations will be stricken from the list.[2] That the standard, low though it be, may even then be to some extent nominal has not escaped those concerned. "In the case of independent examining bodies holding examinations designed for the special purpose of a medical preliminary, it may be difficult to obtain a guarantee without an inspection of marked papers from year to year. In such examinations, where the responsibility of marking answers rests on one examiner, who may be changed from time to time, the variation of standard may be considerable."[3] Meanwhile, there are qualifications resting upon

[1] This body may be cited in explanation of the characteristically English situation just described. The College of Preceptors is a body originally composed of private teachers, who procured a charter permitting them to conduct examinations and issue certificates therefor. The College holds written examinations at regular intervals in education, English, history, geography, mathematics and natural philosophy, bookkeeping, French and other modern languages, physics, chemistry, political economy, etc. On the basis of these written examinations, they issue diplomas for teachers, college certificates accepted by the London County Council, the various medical examining boards, etc. Examining organizations of this kind are, on the whole, obstacles to educational development; for they encourage and reward the things from which English education is struggling to free itself.

[2] "On and after the close of the year 1913."

[3] *Further Report by Educational Committee to General Medical Council*, May 30, 1900, p. 340.

a somewhat higher preliminary basis. The M.B. conferred after examination[1] by the University of London presupposes matriculation in six subjects, English, English history, mathematics (including arithmetic, algebra, and elementary geometry), a foreign language, and two additional branches,—one probably a science. At Cambridge, the candidate must matriculate in Latin, Greek, arithmetic, algebra, geometry, and in one of the following three,—theology, logic, or science. Almost all the Cambridge and Oxford students first obtain a degree in arts; but this is required only at Dublin University. Of all students throughout the kingdom, 28 per cent are said to register on the minimum basis.

Educationally, the situation is less clear than the above characterization would suggest. I have said that the universities have an entrance standard above the minimum; but, as I have already intimated, the university student may comply with either standard, as he pleases. The higher standards affect only those who are candidates for the university medical degree; the authorities are quite willing to teach in the same classes others who have no intention of proceeding to it. Notwithstanding the diversity of bases on which the license to practise may be obtained, the schools cannot be distinguished from one another in respect to entrance standard. If, for example, the universities trained only students who, being candidates for their degrees, had matriculated with that end in view, English medical schools could be thus classified: one group, resting on the minimum basis in the matter of preliminary education, would prepare candidates for examination by the professional corporations; another group would comprise the universities training students for their own degree examinations and requiring as preliminary thereto university matriculation; Cambridge and Oxford might perhaps form a third and higher level, requiring the bachelor's degree, now already quite generally offered by their students. As a matter of fact, however, the provincial and Scotch universities, while requiring university matriculation[2] of students who expect to proceed to the university M.B. degree, are quite willing to accept and to teach students who, expecting to qualify through one of the professional corporations, submit only the inferior preparation. For instance, in 1903, out of a total medical entry of 23 at the University of Liverpool, only 9 were candidates for the university degree, 14 might have complied only with the lower requirement of the Conjoint Board and other corporations; that is to say, over 60 per cent of the entering class might have been below the presumable level of the instruction, if instruction is assumed to be calculated in reference to the entrance standards of the institution. The next year, out of 20, there were only 5 degree students. Since then, the relative increase of the degree contingent would

[1] The candidate studies medicine at any medical school in the United Kingdom, or at a colonial or Indian medical college; as to that, the University of London is indifferent: it merely examines.

[2] The term "matriculation" does not in Scotland technically signify the entrance examination,—the sense in which it is here employed,—but the registration of the student with the payment of certain fees. It should also be noted that the entrance basis in the medical faculty in Scotland is distinctly lower than that in Arts and Science.

appear to indicate that the tendency within the university is toward homogeneity: out of an entry of 35 in 1907, 19 were degree students; out of 30 in 1908, 15. During the five years, 1906–1910, 345 students entered St. Bartholomew's, of whom 95 aimed at the London degree, 153 at Cambridge, Oxford, or provincial degrees, and 97 at the diploma of the Conjoint Board. At Edinburgh, "students who do not intend to graduate in medicine in this University may attend any of the classes in the faculty on payment of matriculation and class fees."[1] The instruction cannot fairly be pitched at a definite level until the admission standard is uncompromisingly identical with the degree standard. Until that happens, the standard is the student's, not the university's. Nor is the student's standard necessarily a medical student's; for dental and veterinary students enter common classes wherever those departments are found. These discrepancies indicate a situation in which differentiation along modern lines has begun to take place but recently and is very imperfectly carried through.

The same confusion of students at different levels with different goals has created a very perplexing situation in London. Strictly speaking, the University of London is, as I have already pointed out, merely an examining body: an individual, having studied where and how he pleases, appears before the University to be examined, first for matriculation, later for graduation. Where he has studied before matriculation, or between matriculation and appearance for graduation, is immaterial to the University. The London medical schools are nominally parts of the University of London; that is, some of the recognized teachers in these schools have seats on the senate or governing body of this non-teaching university. The senate can make rules and set up conditions regulating university examinations; but its arm does not reach into the internal affairs of any of the so-called constituent colleges or schools in medicine. For all practical purposes, the University of London has no more genuine relation to the medical schools of Guy's or St. Bartholomew's than to that of the University College of Dundee; it will examine a candidate who has studied at either, provided only he has previously passed its matriculation examination,—an examination somewhat more difficult than the minimum above set forth mainly because all parts of it must be passed at one sitting. Meanwhile, the London schools, part of the University of London though they be, receive as students not only those who have matriculated in the University of London, but those who, without designs on the M.B. degree, expect to qualify at Apothecaries' Hall, the Conjoint Board of London, the Triple Board of Scotland, or one of the Irish corporations, all admitting on the minimum requirement laid down by the General Medical Council. Let us suppose two students at St. Thomas's, for instance: one presents for admission a certificate from the College of Preceptors; the other has matriculated at the University of London. After substantially the same course of professional training,[2] the former must be content with the qualification of a professional corporation, the latter can append

[1] *Calendar, University of Edinburgh*, 1910–1911, p. 478.

[2] The latter is six months longer.

the magic "M.B. London" to his name. Now it happens that the degree of M.B. is obtainable at Edinburgh after passing a set of matriculation examinations hardly, if at all, more difficult than the examinations in general education required by the London Conjoint Board. Hence, what is denominated the hardship inflicted on London students. Entering a London hospital school on the minimum basis, they forfeit the degree that on the same basis they could obtain at Edinburgh; to gain the degree in London, they must satisfy the higher matriculation requirement of London University and study half a year longer. Meanwhile, for our present purposes, the point to note is the impossibility of working out a curriculum in a London medical school from a fixed starting-point, for none such exists. There, as in the provincial and Scottish universities, matriculation does not mean compliance with a standard on the basis of which the university conducts its instruction, but merely the amount of attainment from which the university reckons its degree. A student at King's goes in for the London M.B. degree. He fails: but instead of dropping out, he remains in attendance, taking precisely the classes he would have taken had he passed. He cannot get the London University degree—that is all. The matriculates who fail and the matriculates who pass do practically the same work. Just what matriculation means in reference to the quality of university instruction under such circumstances, it is not easy to say. Meanwhile, the so-called grievance of the London medical student is more important to him than to any one else. The real difficulty is not that matriculation for the London degree is harder than the entrance basis adhered to by the corporations, but that neither basis represents a sound secondary schooling from the standpoint of medical education. In neither case is the training required to pass pertinent to the object for which a specific entrance basis is maintained. Both now tempt the student to break rank and leave school in order to be specially coached. The German policy necessarily recurs to mind: there, professional education frankly connects with secondary education. Its basis coincides with the leaving standard of the gymnasium. The complete reliance of the university upon the secondary school has been a powerful force in making the secondary school strong, and in giving it variety of form in keeping with the different vocations and professions to which it leads.[1]

The Cambridge and Oxford standard, while less accommodating in that the terms of admission are not at the student's discretion, does not actually fix the level of instruction throughout the curriculum. The fundamental sciences alone are taught at the two universities; for clinical teaching, the students repair to London or provincial hospital schools. A Cambridge M.B. has therefrom received scientific training adjusted to university matriculation and clinical training designed in the first place for the much larger body of London hospital school students, whose preliminary education falls considerably short of university matriculation.

[1] A Royal Commission on the University of London is now sitting. For complete information as to the entire problem of higher education in London, the reader is referred to the admirable account by the late Sir William H. Allchin, entitled: *Reconstruction of the University of London*, 3 vols. (London, Eyre & Spottiswoode).

That the requirement as to preliminary education is adequate when viewed from the standpoint of modern medicine, few now contend. It can be satisfied by a candidate who has no knowledge of any modern language but his own, who has had no training in science whatsoever, and whose acquaintance with mathematics is too limited to support a proper study of physics or chemistry in future. Of ominous importance is the well-nigh universal ignorance of German. Few indeed of the leading British practitioners read that language: they are thus reduced to slow and indirect methods of communication with the main source of progressive ideas in medicine during the last half century. Ideas must have become current in English publications before they are accessible; a considerably larger proportion would encounter them in French; in either case, anything like thorough acquaintance with the literature of a topic at the time of its fullest and most stimulating discussion is out of the question. Not only is a knowledge of German not required — its necessity is not even keenly felt. The report of the Board of Education above quoted states that "it is a matter for regret that there has been some diminution in the study of German."[1] The percentage of the students who offer German in the examinations most in vogue is actually declining. Of candidates appearing before the Joint Board in 1896, 15.25 per cent offered German; in 1907, only 12.7 per cent. The Oxford Senior Local Examination in 1895 was tried by 1414 candidates, of whom 24.2 per cent entered for German; in 1907, by 6370 candidates, of whom 5.6 per cent offered German; in 1910, by 10,437 candidates, of whom 4.7 per cent offered German. Even the more modern provincial universities, where the pressure of industrial and commercial need is acutely felt, show no better results: at the joint matriculation examination of the universities of Manchester, Liverpool, Leeds, and Sheffield in 1907, 188 candidates out of 2012 (about 9 per cent) came up for German; in the preliminary examination of the Scottish universities in 1909, 46 out of 920 (5 per cent) took German.[2] Some of the others may have had a smattering, but not enough to pass a quite elementary test.[3]

It is of course true that a considerable portion of the student body have had more education than is indicated by the stipulations to which they conform; but there is no reason to suppose that it is adequate to the load it must carry. This is fairly to be judged from two sets of statistics. In the first place, the general percentage of rejections among all pupils who go up for examination at the stage of supposed fitness for the medical school: 36.5 per cent in the Oxford senior locals, 33.6 per cent in the corresponding test at Cambridge, 56.4 per cent in the matriculation examination at Durham, 68.1 per cent in the medical preliminary at Edinburgh, 60 per cent at Aberdeen, 65.4 per cent at Glasgow, 76.1 per cent in medical preliminary of the College

[1] Page 43.

[2] Figures taken from supplement to *London Times*, September 6, 1910, p. 510.

[3] Sir John Struthers, in the report above mentioned, says of Scotland: "From more than one quarter comes the welcome intimation that there are unmistakable signs of a revival of interest in German" (p. 30).

of Preceptors, 60.4 per cent in the Educational Institute of Scotland.[1] Equally significant of the inadequacy of basis is the mortality in the early professional examinations: between 1905 and 1909, 39 per cent of its candidates were rejected by the Conjoint Board in Chemistry: 38 per cent in physics, 37 per cent in elementary biology.

The defect is patent: the requirement sets up none too strenuous a performance for a boy of fifteen. The average age of entrance upon medical study is over 19.[2] In 1908, over 33 per cent of English students registered as beginners by the General Medical Council offered the easiest acceptable certificate; in Scotland, 12 per cent; in 1909, 35 per cent in England, 15 per cent in Scotland. But the more difficult examinations—the so-called junior and senior—represent a wholly inadequate performance for a student in his twentieth year.[3] The discrepancy between what is asked and what the student might have performed betrays the undeveloped condition of secondary education in Great Britain; but the tender considerateness of medical educators is not calculated greatly to accelerate its progress. The proprietary interest constitutes a most formidable obstacle; nowhere has it been solicitous to hasten general educational progress to its own hurt. For present conditions the medical schools are not originally to blame; unfortunately, however, they are hardly yet to be reckoned among the more active forces making for better things: the General Medical Council has not yet ventured prospectively to add a science to its preliminary requirement, despite the improved promise of the secondary schools. In consequence, those educators struggling for the development of scientific training fight without the assistance that such future compulsion would afford them. "From the first," say the science teachers of the public schools, "the advocates of science have had to struggle against the firmly established position of the classics as instruments of education."[4] Nor has medicine ever yet been educationally so far independent of proprietary and corporate interests as to give the aid involved in the announcement of a scientific requirement, to take effect, say, even five years hence. Favoring the elimination of the so-called junior examinations, the General Medical Council finds itself unable to drop them because that step would either diminish the number of candidates entering an already too crowded profession, or, by way of avoiding a result so disastrous to proprietary schools, lead examiners to mark more leniently, thus depreciating the higher examinations to the lower level.

The baneful consequences of proprietary organization thus turn up at every move.

[1] *Minutes*, May 26, 1908, General Medical Council, pp. 22-24.

[2] The Education Committee of the General Medical Council has made most interesting studies on this point: see the *Interim Report by Education Committee*, May, 1907.

[3] "Under satisfactory educational conditions the senior level should be attained by youths leaving school between 17 and 18 years of age, that of the junior at 16." Advanced sheets of Appendix IV, *Report of Education Committee*, p. 7. "Under satisfactory educational conditions, the level of the senior examination ought to be attainable by youths from 17 to 18 years of age; in the present circumstances only 25 per cent of the entrants pass the preliminary examination by the age of 18." *Interim Report by Education Committee*, May, 1907, p. 12.

[4] *Report on Science Teaching in Public Schools*, Education Pamphlet 17, Board of Education (London, 1909).

English secondary education requires stimulus and direction from every possible source. A learned profession might exercise a powerful leverage. Medicine cannot. It is content tardily to participate in the consequences of educational progress after the event. Though the profession is overcrowded, it does little to compel educational progress. The reason is not far to seek: replying to an inquiry by the General Medical Council as to the practicability of higher entrance requirements in 1899, the then dean of the Manchester School replies negatively as follows: "As a collateral issue I may further be allowed to point out that any marked diminution in the number of students entering at the several medical schools must necessarily affect the material well-being and efficiency of these institutions."[1] The proprietary school always reckons on the assumption of its own survival. At the moment, the present requirement may be on the whole the best obtainable; but the phrase "on the whole" includes as factors the proprietary school and a profession governing itself on that assumption.

As opposed to centralization of all power and responsibility in a governmental bureau, — the situation in Germany, — the vesting of such responsibility largely in a learned profession itself is highly attractive. How far it can be carried depends altogether on the sensitiveness of this guild-like body to the public interest. Now a guild-like organization is admirably calculated to protect honor and dignity, to conserve ceremony, and to transmit tradition. But the relative importance of these things to the members greatly transcends their absolute importance to the public. It does not follow that one is wholly insensible to the picturesqueness of professional tradition because one suggests that bodies conserving a tradition have to prove their fitness under modern conditions to legislate on such subjects as professional education. The Royal Colleges, the various Halls, are historically impressive; but as vested interests they may obstruct the determination of an issue on its merits. The interest of a guild lies largely, although, of course, by no means wholly, in the past, or perhaps better, in the past idealized; how far it is permeated by modern ideas depends upon the degree to which its members as individuals are exposed to influences that compel readjustment. In the case of physicians, this is doubtless considerable; hence the profession has not stagnated. But, on the other hand, it has not been educationally aggressive. Representative councils, committees, and corporations composed exclusively of medical men, most of them at or beyond middle life, are apt to be needlessly conservative. As a matter of fact, England and Germany combine to show, positively as well as negatively, that medical education is not so much a medical as an educational problem. Jurisdiction must lie with educators as well as with physicians. When the educational motive is properly emphasized, one ceases to look at a proposed reconstruction from the standpoint of its effect first of all upon proprietary interest or corporate privilege. The educator represents the public interest; he views the educational facilities of the nation in reference to one another, aiming to develop them in harmonious interaction. On the day that his voice is heard,

[1] *Interim Report by Education Committee*, June 5, 1899, p. 20.

a new point of view is established: unnecessary schools, for whose benefit low standards are continued, are suffered to expire; the survivors coöperate with universities and other permanent educational institutions to force the development of secondary education on the modern side. With fair warning, they will furnish intending students with the best of reasons for participating in this movement by denying them entrance to the profession on any other terms.

The situation in France—definite like that in Germany—need not detain us long. The medical student must have achieved the baccalaureate that marks the termination of the lycée—a secondary school of gymnasial stature; in addition, he is required to pass a year in the study of the preliminary sciences, which in Germany and Great Britain still cumber the medical curriculum. A baccalaureate course of secondary instruction plus a certificate covering the study of physics, chemistry, and biology, issued by the faculty of science, constitutes the basis of medical education throughout France.

The baccalaureate course takes any one of several forms, all leading to the same degree. Since the far-reaching secondary school reforms of 1902,[1] complete parity has prevailed as respects the classics, the sciences, modern languages, and mathematics. A four year primary course constitutes the uniform basis; seven years of secondary instruction follow, divided into two parts, four and three years in length respectively. In the first part, the student elects between the classics, with or without Greek, as he desires, and a modern course largely scientific in content; in the second, he chooses one of four groups—the classic languages, Latin and modern languages, Latin and science, modern languages and science. History, geography, and mathematics are, of course, present in all. The lycées of the great cities are large and flexible enough to contain all the alternatives; at smaller places, the authorities select with regard, as far as possible, to local conditions.[2]

The examinations at the close of the course are conducted under the direct supervision of the national Minister of Education. They are both written and oral, the former two to four hours in length, the latter forty-five minutes. The control of the Minister may extend to the choice of texts and subjects for the written examination; but more commonly, the examination, like the leaving-examination of the German *Gymnasium*, is in the hands of the school faculty.

The French boy, like the German, is thus systematically trained with clear view to a possible professional superstructure. The baccalaureate standard bears everywhere the same value. The teachers, who are shortly to begin training men to law, medicine, or what not, know exactly on what they build. It is true that, consistently with the Napoleonic origin of the system, the spirit of the lycée is less individual than the range of selection that it allows, a survival from the former régime under which all were

1 Based on the *Enquête sur l'enseignement secondaire*, 1899, 6 vols.

2 For details see *Plan d'études et programmes d'enseignement dans les lycées et collèges* (Paris, Delalain Frères). An excellent account in English is accessible in F. E. Farrington's *French Secondary Schools*, chapter vii (London and New York, 1910), which has been utilized in the preparation of the text.

put through the same grind. However, where option takes place, individuality will in course of time make itself respected. Meanwhile, France has gone further than any other country in stipulating that medical education shall rest on a basis not only high and uniform, but determined or supplemented by the specific requirements of modern medicine.

CHAPTER IV

THE PRELIMINARY SCIENCES: PHYSICS, CHEMISTRY, AND BIOLOGY

The subjects composing the medical curriculum may be conveniently considered in three groups: the first including the basic or preliminary sciences, physics, chemistry, and biology; the second including the underlying medical sciences, anatomy, physiology, pharmacology,[1] and pathology; the third made up of the clinical branches, medicine, surgery, and obstetrics. The second and third divisions form the medical curriculum taken narrowly. The basic sciences, now to be discussed, are introductory only. Why need they be taught at all?

The medical sciences—anatomy, physiology, and pathology—begin at what may be designated as the second level. They may be regarded either as specialized branches of one of the basic sciences, or as involved and complex products of several of them. Anatomy and pathology are thus subdivisions of biology, broadly viewed; physiology is a biological science in which both chemistry and physics are also inextricably involved. To an intelligent comprehension of the outright medical sciences, a working knowledge of the basic sciences, physics, chemistry, and biology, is indispensable. In the first place, the medical sciences employ as their language terms and concepts that they themselves did not originate and cannot stop to explain; such as induction, refraction, cell, reaction. The shortest way, perhaps the only sure way, to gain possession of these concepts is by acquiring them in the sciences in which they are first and most simply used. Precisely the same holds of methods and technique; the student who comes to the study of anatomy without training in the use of the microscope, to the study of physiology without ability to handle an electric battery or to carry out a qualitative analysis, is sadly handicapped. For the medical sciences are experimental, not merely descriptive; and while even in their descriptive form they cannot be understood without a knowledge of the basic sciences, intelligent experimental study is out of the question to a student who lacks practical skill, brought over from the basic sciences.

Nor does the need of such practical skill cease when the student escapes from the laboratories to enter the clinic. For here again he is referred back to a previously acquired knowledge of physical and chemical principles and a previously attained skill in the practical methods of physics and chemistry. Diagnosis leans heavily nowadays on the basic sciences: percussion and auscultation are physical methods; the ophthalmoscope, the laryngoscope, the Roentgen ray, the sphygmograph, are bedside appliances not to be intelligently employed except by those who understand the physics of each; in the clinical laboratory, equally important diagnostic factors are disclosed when chemical methods are employed in the analysis of the waste products, the secretions, and the fluids of the body. Finally, the conflicting claims of therapeu-

[1] In Germany, pharmacology would be included in the third division.

tists, and still worse, of the pharmaceutist pushing his wares, can be judged only by physicians who firmly grasp chemical theory.

The material provision for all scientific study in the German[1] universities is generally and uniformly excellent. The several sciences usually occupy separate buildings or "institutes," as they are commonly called. However different in size and splendor, they are essentially alike in point of structure, equipment, and organization. Each contains properly furnished lecture rooms, with every facility for effective demonstration: blackboard, projection-screen, lantern, running water, etc. Adjoining the auditorium are preparation rooms, containing all the apparatus and instruments required for the setting up of demonstrative experiments. Every department has its own library for current use, its own photographic outfit, its own museum and collection. The chief possesses an adequate suite, in which he carries out his own researches. Separate rooms are usually provided for each assistant and each of a few advanced workers,—for advanced workers are nowhere plentiful. Larger rooms are reserved for the practical courses arranged for undergraduate students.

The staff organization consists of the professor, his assistants, advanced workers, and the necessary helpers. The professor delivers the general lecture course, supervises the laboratory courses designed for undergraduates, and directs the research of his advanced students. It is not uncommonly believed that, as his heart is in research, his more elementary teaching is perfunctorily given. Such is by no means generally the case. Not infrequently the German professor spends himself so freely in teaching and what goes with it that he himself ceases to be largely productive. He produces in such instances mainly through the picked individuals who are admitted to the larger opportunities open to those who, as assistants or special workers, enjoy intimate intercourse with him. A characteristic and highly important factor in laboratory efficiency is the skilled helper,[2] who, originally only a servant, has by long experience acquired so thorough a knowledge of the running requirements of the institute that he is absolutely indispensable. He is, as a rule, thoroughly familiar with apparatus, can mend, adjust, or replace it; he can set up demonstrations, relieving professor, assistants, and advanced workers of all the drudgery of preparation; he is responsible for cleanliness and orderliness, and he is usually equal to the responsibility. If mechanically gifted, he is at times paid more than an assistant.[3] His loyal and devoted services are appreciated by those who benefit from them, for he shares in the dignity of his institute; regarded and treated as an official, he is not uncommonly pensionable; his name and function are recited in the catalogue, in close proximity to that of the chief and his associates. Like them, too, he is decorated for long and

[1] From this point, the words German and Germany include the German Empire and German-speaking Austria, where the conditions, generally speaking, resemble each other. When differentiation is necessary, I shall speak of the German Empire and Austria, respectively.

[2] *Diener.*

[3] An assistant in physiology at Giessen gets 1200 marks a year; the helper, 1400 marks. The *Diener* often gets *Wohnung* (residence-quarters) in the institute for himself and family besides.

honorable service, albeit in an inferior position. The assistant helper in the bacteriological division of the physiological laboratory at Berlin wears the badge known as the general order of merit;[1] so also does the mechanician in the main institute and the preparator in the laboratory of anatomy. The chronicle of the University of Breslau[2] records in one sentence the facts that in the annual conferring of distinctions, the professor of anatomy received the second class of the order of the Red Eagle, and the first helper in the laboratory received the cross of the general order of merit.[3] These instances are in no wise exceptional.

The departments of physics, chemistry, and biology belong, as a rule, to the philosophical faculty, although in Austria the medical faculty contains an independent chair of chemistry applied to medicine. The student pursues his studies in these three sciences in connection with the required medical sciences during the first two or three semesters. The departments themselves offer every opportunity for both theoretical and practical work. But as the student has already begun his medical studies and time presses, his work is usually restricted as nearly as may be to the simplest forms of instruction offered.

The backbone of university instruction in science is the demonstrative lecture. In the course of one or two semesters, the professor in charge of the department reviews the main facts and the leading principles of his domain, illustrating his exposition, as he proceeds, with simple experiments, for which all necessary preparations have been made by assistants and helpers in advance. A student assembly ranging from fifty to three hundred or more listens to an excellent account of the topic in hand and witnesses the final stages of an illustrative experiment ready to be touched off before they take their seats. Usually, in the following semester, a practical course of selected experiments is offered in which the student may be carried over the same field that he has demonstratively traversed.

The minimum requirements in the basic sciences following the usual recommendation are as follows: physics, lecture courses covering one or two semesters; botany, lectures during one or two semesters; zoölogy, lectures during one semester; chemistry, lectures during two semesters, laboratory exercises during one semester. The student's basis in science, obtained incidentally in the course of his first three semesters, thus consists of six or seven courses of demonstrative lectures in four different subjects and a course of laboratory exercises in one of them. In physics, zoölogy, and botany he need do no practical work at all; in chemistry alone is a practical course compulsory. The requirement in question applies to all students, no exception or allowance being made in favor of the *Higher Realschule* graduates, who have already traversed the ground more thoroughly than it is covered in the university. They can-

[1] OA, "Allgemeines Ehrenzeichen." [2] *Chronik*, 1908–1909, p. 76.

[3] Research workers, requiring even more intelligent aid, frequently employ women helpers, who are paid sometimes by the investigators themselves, sometimes by means of grants or donations. It is now urged that some systematic provision should be made for the proper training of laboratory helpers.

not abbreviate their term of residence at the university by obtaining credit for work already performed. They enroll in the required chemical laboratory course, from which they then absent themselves; a minority of unusually eager students devote themselves to advanced work.

The important points in the German arrangements, then, are these: the basic sciences are deferred to the university; they are not taught with special reference to medicine; they are scattered through three semesters, during which anatomy and physiology are simultaneously pursued; finally, instruction in them is largely demonstrative in character. Let us consider these characteristics from the standpoint of educational efficiency.

It is obvious that the basic sciences must be included at least optionally in the medical curriculum as long as most medical students prefer the humanistic gymnasium. Now, while the scientific schools were at first well content to share on even terms the gymnasial privileges with reference to the university, it does not follow that the medical faculty can permanently concede their entire equality. Even before the *Realgymnasium* became a permissive alternative, Pagel urged that it must be made universally obligatory upon those entering on the study of medicine.[1] The same end would be accomplished by requiring graduates of classical *Gymnasia* to find physics, chemistry, and biology, precisely as graduates of the *Higher Realschule* are now compelled to find Latin. The question turns on the comparative advantages and disadvantages of the practice of postponing. In discussing this, we must in a measure cover again ground passed over in the preceding chapter.

In behalf of postponement, as now generally in vogue in both Germany and Great Britain, it is argued that science studies undertaken in connection with the object on which they bear gain in seriousness. The student is sufficiently mature to realize the importance of a task not itself immediately professional in character. His teachers can select material adapted to his vocation and drive it home by means of pointed references to medical needs and uses. It is urged that he will probably apply himself with greater vigor and greater intelligence than during the vaguer and less purposeful stages of his secondary schooling.

The objections are, however, very weighty. It is questionable whether the first years of professional study are really more earnest than the last years in the secondary school. Such is clearly not the case in Germany, where the first semesters at the university are more or less generally abandoned to the pleasure-seeking characteristic of student life. Elsewhere, too, a change of residence that carries a boy into a larger city may not furnish the conditions best calculated to promote close application. At best, whatever the recommendations, they do not compensate for the overloading of the curriculum and the rising age of the medical student at graduation. The probabilities are that more things will have to be put into the curriculum; something may be excised, but probably less than must or will be added. Is the increased time always

[1] J. Pagel: *Einführung in das Studium der Medicin*, p. 56 (Berlin and Wien, 1899).

to be procured by lengthening the curriculum? Certainly not, unless the most effective and economical use has already been made of the years just preceding medical study. Has this been done? Is it possible to hold that the best use has been made of the years from sixteen to nineteen, when a boy expecting to study medicine can reach the age of nineteen without a thorough grounding in physics, chemistry, and biology, and the mathematics necessary to the first two? Further lengthening of the medical curriculum must, therefore, as a prudential measure, be obviated by more effective use of the three preceding years. Even if no such danger threatens, it would be no misfortune if the present average length of the curriculum could be reduced by the same policy. For a waste of time can in no case be either a moral, an economic, or an educational gain.

A second objection, already noticed in the previous chapter, cannot be over-emphasized: to defer thorough scientific study until professional education begins, as the Germans do, means that the student cannot acquire strict scientific spirit and method until he is already full grown. To that degree the secondary and intermediate schools are emptied of positive content of formative and stimulative character; they tend to become schools devoted to purely formal discipline. Now it is undoubtedly possible to begin rigorous scientific work too early: to teach children physics in the shape of abstract formulae and chemistry by symbolic equations is obviously premature; it does not establish scientific thinking, it does not cultivate observational power or interest. It may prematurely injure both. But because a thing may be done too early is a poor reason for actually doing it too late. Beyond question, to let a boy get well-nigh to manhood without practical training in such physical or chemical experimentation and calculation as compels him to analyze phenomena and to apprehend laws is unpardonable. This is, however, what happens when the systematic study of the basic sciences is deferred to the university. Nor, as already shown, are the necessary conditions satisfied by unsystematic and superficial scientific instruction in the secondary schools, that serves mainly to break the monotony of the formal occupations to which the curriculum is otherwise largely abandoned. Nature study in unsystematic form has indeed an important function in the child's training; for it provides him with raw material, in the procuring of which his senses are sharpened, while his zest in their exercise is continuously heightened. But the scientific basis of medical study must be something more critical. It is no longer enough for the student to be aware of nature's fascinations; he must endeavor to conceive phenomena in terms of law. Rigorous experimentation must be added to delighted observation; symbolic formulae must succeed animated description. The latter years of youth furnish the most favorable opportunity for converting the random play of curiosity into sober, rigorous, and reflective pursuit of the several sciences into which the phenomena of the external world are resolved. The medical curriculum consciously or unconsciously assumes from its start that the student possesses power of this type. That is assuredly not the least cogent argument in favor of his previously obtaining it.

Postponement radically alters the character of the instruction and its amount by abbreviating the time available for it. The point of departure in science teaching is the experiment. Now the experiment may be employed in either of two ways: demonstratively or actively. The student may witness an expository presentation skilfully and freely illustrated by experiments conducted by the professor; or he may himself carry out an experiment, though, of course, with much less artistic neatness and smoothness. With the exception of one semester's practical course in chemistry, the German gymnasiast's study of the basic sciences is, as I have pointed out, demonstrative only. For his subsequent need this is clearly inadequate. A demonstration will undoubtedly convey a fact or a principle; but it has no power to transfer manual expertness. In so far as physiology, for example, applies physics and biology, the student is but slightly assisted by a bookish knowledge of particular facts; he must be able to use physical and biological implements and methods. No passive witnessing of experiments smoothly executed by an expert who touches off a series neatly arranged by the *Diener* and assistants in advance, no merely intellectual grasp or knowledge of law thus expounded and illustrated, can take the place of actual participation by the student on his own responsibility. Demonstration, text-book, and lecture may all be useful; but the quality of the training is once for all determined by the extent of the practical features that fall to the student himself. Nor is such participation valuable solely because it cultivates dexterity; it is enormously stimulating. When the professor lectures and illustrates, the pupil follows in his wake. He has done his duty if he understands. To the experimenter, be he professor or student, difficulties and alternatives appear. In the act of experimenting, even the student does more than follow: he distinguishes, selects, tries out; his very blunders make a beneficial exercise in the practical logic of experimental science. Instruction of this type is, however, costly in respect of time. The opportunity is not obtainable, when the medical sciences proper and the clinics are clamoring for every available moment. Postponement is thus synonymous with hasty, superficial, mainly demonstrative teaching.

Finally, the dispersion of the basic sciences through the early semesters does not conduce to their practical application in the other sciences. As a matter of fact, they are not introductory. In consequence of the freedom of the student in arranging his course of study, the instructor in the medical sciences has no way of knowing which of the basic sciences his students have pursued. Lack of homogeneity compels him to eliminate them from his calculations. If some members of a class have had chemistry and others not, the instructor inclines to take the negative view in presenting his own subject. In consequence, the basic sciences do not furnish the medical sciences with their point of departure; nor are they worked up into the very tissue of medical instruction. The teachers of physiology and pathology, instead of freely using chemical and physical methods, tend to do just the reverse: each science is presented for itself. Where they touch, the most elementary illustrations, if employed, have to be explained. We shall subsequently see that the examination requirements are so slight that a successful outcome constitutes no convincing presumption of serious study. "The medical student has paid for his course in chemistry," remarked a professor of hygiene to me, "but that does n't mean that he has worked at it." The modicum of information, which for the foregoing reasons is all the examination expects, is too frequently procured from drill-masters who employ quiz-compends or other handy manuals prepared for the purpose.[1]

The damage done to most students by the present German arrangement is irreparable. From the first, the curriculum is hopelessly overloaded,—clogged with more subjects than it can possibly carry,—and embarrassment due to this cause threatens to increase rather than to diminish. However time may be economized by better teaching, the only part of the cargo that can be unloaded is the work in the sciences here in question. If this is not done, biology may perhaps be recovered in course of studying anatomy and embryology; but physics and chemistry can hardly be retrieved. Leipzig offers short cuts to the requisite proficiency in the shape of special courses,—three laboratory courses are offered in medical chemistry, and as many in medical and pharmaceutical physics; the attendance is fair,—247 in the summer semester, 1911, as compared with 401 in the anatomical dissecting courses. But the conception is open to serious question: what is medical chemistry? If it means an immediate attempt to deal with the properties and abnormalities of bodily fluids and secretions, it involves an unintelligent procedure, certain to break down. If it confines itself to the chemistry involved in medicine to-day, it may be partly antiquated to-morrow. Only fundamental and practical training in general chemical and physical principles received during the period when time is relatively plentiful and inclination favorable will certainly stand the student in good stead during a sufficiently protracted period.

In Great Britain, the basic sciences usually make a group occupying the entire first year in the medical school, an arrangement distinctly preferable to the dispersed treatment practised in Germany. For the time being, this is also probably the best that can be done; the rudimentary state of secondary education in England leaves no other course open. It will be remembered, however, that, subject to the criticism of the General Medical Council, any university conferring the degree of M.B., or any professional corporation authorized to hold qualifying examinations, is free to arrange otherwise, if it please. Thus, despite the disapproval of the Council, the Conjoint Board in London accepted as evidence of satisfactory preparation for examination in these subjects, certificates representing science work in secondary schools.[2] The

[1] The Germans call these booklets "Eselsbrücke."

[2] The student can thus gain subject credit in three sciences; but time credit is limited to six months; that is, he must spend at least four and a half years in a recognized medical school even if his basic sciences have been previously discharged. The General Medical Council long disapproved the action of the Conjoint Board in this matter; and the difference of opinion has not been without unfortunate consequences. I have stated that, by way of unifying control, the General Medical Council has favored the compulsory registration of medical students at the beginning of their medical studies, by which regulation actual control of the preliminary education requirement would be transferred to the Coun-

Council has now conceded the point. The theory involved in this policy is, as I have repeatedly urged, sound; its influence on the secondary school is wholesome; whether it has been or can now be carried out without disregard of standard appears, however, questionable. The Conjoint Board accepts at face value certificates covering all or part of the teaching requirement in the preliminary sciences from sixty odd secondary and other schools. A detailed inquiry, made in 1903,[1] into the conditions under which this instruction was given appears to indicate that the Board then lacked intimate and reliable knowledge of its extent and quality.

The provision for the three sciences under discussion in the way of equipment and teaching force in Great Britain is very uneven. The universities — those of the provincial towns, Oxford, Cambridge, Glasgow, Edinburgh, King's College and University College, London — possess modern laboratories in charge of strong productive scientists, though externals vary greatly. Sir William Ramsay's quarters at University College are cramped and dingy: but clean-cut scientific ideals procure at once vigorous teaching and brilliant productivity. The laboratory plants at Liverpool, Manchester, and Cambridge, on the other hand, leave little or nothing to be desired; they are quite up to the best continental standards. Indeed, the condition of the preliminary sciences[2] in the British universities makes them the most powerful influence for good in British education to-day. Largely the outcome of private endowment, they furnish concrete examples of what a proper provision for science teaching means, and what its outcome — practical and theoretical — may be expected to be.

Very different is the situation in the London hospital schools and the Extra-Mural School of Edinburgh. Not only is the equipment meagre; scientific ideals and spirit are conspicuously lacking. As a rule, a single room is provided for each of the three subjects; it contains what is absolutely needed for the purpose in hand, and rarely anything further. In London, part-time teachers are sometimes employed: the same individual conducts perfunctory courses at several schools, or an individual otherwise engaged, as analyst, for example, is employed to teach science in a hospital school for a stipulated number of hours weekly. Poverty has led three of the London schools — St. George's, Westminster, and Charing Cross — to discontinue the teaching of the scientific branches; their students now resort to the laboratories of King's or University College. The London schools can at best afford only such science teaching as the fees of the students pay for, and as the number of such students is in no school large, and in several absurdly small, it follows that instruction is bound to be inadequate. It has been proposed to consolidate the teaching of the sciences in three institutes serving all the existing hospital schools. The proposition, however, has fallen through.

cil. Between 1880 and 1900, the Royal College of Surgeons accepted registration by the General Medical Council as evidence of proper preliminary education; in the latter year, the Royal Colleges of Physicians and Surgeons withdrew from the arrangement.

[1] Report by Education Committee on Returns from Teaching Institutions, furnished by Conjoint Board in England, May, 1903.

[2] To which physiology must also be added. See chapter vi.

There is, in truth, an irrepressible conflict between proprietary interests and scientific ideals. Proprietary interest seeks to keep alive every existing school. On the other hand, good scientific teaching once installed in the earlier years will not stop short of thoroughgoing reconstruction of clinical teaching. To create three satisfactory centres of science teaching and to preserve the clinical schools as they are, is a vain attempt to yoke together a tradition and an ideal.

As to method, English tradition and instruction are highly favorable. The Englishman has little patience with theory. He wants to do things, and to do them for himself. Sport has developed manual readiness and dexterity. Science teachers accept this predilection and make a method of it. The practical course furnishes the backbone of the instruction. Teachers and text-books may expound and amplify, but they never supplant. The English student of physics, chemistry, and biology is in theory expected to learn by doing, not by merely hearing or beholding.

Results, however, appear to indicate that a single year cannot be made to suffice for practical instruction in the three sciences, certainly not with the English medical student of to-day. The actual content capable of mastery is reduced to narrow limits. At Cambridge, for example, where the scientific spirit is strong, the instruction in biology aims at most to bring the student into contact with a series of forms, in order that he may grasp the significance of the whole. The student performs a limited number of experiments; his teacher interprets them on broad lines. At Liverpool, the year's chemistry is so mapped out that one term is devoted to inorganic chemistry, mostly the non-metals; in the second, a short course is given in elementary physical chemistry; about one month is left for organic chemistry. At Manchester, the practical course in physics includes about twenty individual experiments. But it is found that the student knows little mathematics; unfortunately, there is now no time to learn more. He cannot derive the formulae which he employs: at best, he can verify or apply them. The presence of usually inferior pharmaceutical and dental students in the same classes complicates an already difficult situation still further. None the less, it is not to be forgotten that the universities possess spirit and ideals. The boy who studies chemistry or physics in an atmosphere rendered alive and bracing by the presence of a Ramsay, a Roscoe, or a Thomson gets something that does not show in the syllabus. Instruction may perforce be limited in range; it cannot be mechanical or dead.

In the proprietary schools, the instruction is more meagre and the spirit dull. The work is nothing more than a drill conducted according to syllabi furnished by the examining boards. The qualifying examinations will not wander from the syllabus; neither, then, need the drill-master. The prominence of the science syllabus is due to lack of time, to the defective preliminary training of the student, and to the exaggerated importance attached to the details of the examinations, about which we have still to learn.[1] In any event, the science syllabus is the law in Great Britain. The ambulatory instructor has a syllabus for every emergency: if the student has to satisfy the

[1] See chapter xi.

Apothecaries or the Triple Board, this syllabus suffices; if the Conjoint Board or London University, that. Two laboratory exercises a week in chemistry form the prescription for the "First Conjoint;" four half days a week with special tutorial classes are required for London University; every school provides both. The student makes his choice; the instructor has "to put him through." The universities, privileged to examine their own pupils for the degree which carries the license to practise, are in theory much more independent of the syllabus than the hospital schools that can themselves neither grant a degree nor examine for license: but at present, in theory only. For as the universities prepare students simultaneously for their own examinations and for those of the professional corporations, their curricula must pay due homage to the cut-and-dried syllabi.

Perhaps the most undisguised drill of commercial character is to be found at the Extra-Mural School in Edinburgh. The equipment is of the simplest; the end is the successful passing of the Triple Board examination. The prosperity of the teacher depends wholly on the success of his students so measured. The extra-mural teacher of chemistry has rooms in which he conducts classes in organic and inorganic chemistry and does commercial work besides. He lectures to women students daily from ten to eleven, to men from twelve to one; holds one practical class three days weekly in the afternoon for men, and another three days weekly for women; does analytical work and gives a six months' course for the public health diploma. He lives up to a syllabus regulated by the examinations, pays rent for his quarters, and retains his profits. The vigor with which successive groups of students are drilled in the letter is so far from being commendable that it is almost necessarily fatal to the most precious objects of science teaching. It sets up false standards of success, and subjects university teaching to a comparison that may seriously interfere with its adherence to purer and sounder methods. What is even worse, the university accepts this teaching in lieu of its own; a vicious privilege, even if, as is claimed, it means only that university students resort to the extra-mural drill-master to be coached for university examinations. Such official recognition of cram classes cannot be educationally justified. It is not to be supposed that empirical medicine is to be transformed into scientific medicine by students, every detail of whose scientific training has been thus cut to pattern in the most economical fashion consistent with personal safety.

As is always the case with teaching that endeavors to do just enough, science teaching by syllabi accomplishes too little. Of some 250 candidates examined by the Conjoint Board in 1907, 85 were rejected in chemistry, 82 in physics, and 103 in biology; of about 100 examined in the same year by the Triple Board of Scotland, 44 failed in chemistry, 64 in physics, and 35 in biology;[1] at the University of London, 143 passed and 105 failed in physics and in biology.[2] At Liverpool, on the

[1] Minutes May 26, 1908, General Medical Council, p. 10. The Board had accepted as evidence of satisfactory study more than 70 certificates issued by secondary and other schools.

[2] *Ibid.*, p. 14.

other hand, at the close of the chemical course above outlined, there were but 2 failures out of 35.

Reports of the inspections of examinations by representatives of the General Medical Council deepen the impression made by the foregoing considerations. Referring to biology, the Inspectors, while praising the arrangements made for holding the examinations, state: "The Examiners were content with a very modest standard of knowledge, but they were justified by the state of ignorance in which most candidates present themselves. Scarcely a single candidate could be said to have exhibited real grasp of elementary principles. When it was a question of naming the bones in the skull of the frog, easily to be crammed up, answers often came glibly enough; but in other matters of a simple nature, it was extraordinary to see the ignorance of candidates. The names and uses of the different parts of the microscope seemed wholly unknown to many." As to physics and chemistry: "The standard is low; the candidates so badly prepared that a higher standard would have rejected the majority. Most of them showed absolute ignorance and were referred [failed]. Their teachers must have known that they were ignorant and unfit to commence the study of physiology and professional subjects, although they may have put in the number of formal attendances required by regulations."[1] Inspecting examinations in the same subjects held at Apothecaries' Hall, the visitors note the passing of a youth who was ignorant "of the differences between animals and plants and very hazy as to the distinction between vertebrates and invertebrates." Of the training in chemistry and physics, they opine that "if well carried out, it is of no more value than a parlour game or the memorising of a price list."[2] Finally, of the examination in chemistry held by the Triple Board in Edinburgh: "The practical examination in chemistry is hardly worthy the name; it is of extremely little value as training the student's intellectual powers, or as preliminary to the study of physiology, or as giving him something that will be useful in his future career."[3]

Beyond all question, the ultimate remedy in Great Britain, as in Germany,—a remedy which, it may be added, will simultaneously solve other difficulties that we shall encounter as we proceed,—must lie in more thorough and purposeful secondary education. Biology, chemistry, and physics can be systematically and thoroughly taught to boys between sixteen and nineteen years of age; and time will still remain for such other studies as may for one reason or another be held desirable. Clearly, this suggestion remands the basic sciences to the pre-medical period; it takes them out of the medical curriculum. In neither Germany nor Great Britain can the teaching of these sciences as parts of the medical curriculum be held to succeed; yet the effort represents perhaps all possible variety. Germany and the English universities

[1] *Report of Primary Examinations, Conjoint Board,* May, 1903 (passim, abridged).

[2] *Report of Examination Committee,* May, 1903 (passim, abridged).

[3] *Report of Examination Committee,* March, 1903, p. 17 (abridged). A general résumé is published in an undated *Report,* transmitted by the visitors to the Council, October 1, 1903.

teach them in adequate scientific laboratories, the former, dispersed, the latter, concentrated. Neither is satisfactory. The hospital schools teach them with close reference to the professional end; their meagre and spiritless drill likewise fails. But one solution will avail: the fundamental sciences belong to the secondary, not to the professional period. Concentration on the professional object may then begin at once with the study of the explicitly medical sciences next to be considered.

A distinctly successful arrangement of this type may be pointed to in France. After receiving the baccalaureate on leaving the lycée, and before enrolment in the medical faculty, the French student spends a year in pursuing a course made up of physics, chemistry, and natural history, currently known as the P. C. N. Two points are to be especially noted: the course is given in the university faculty of science, not in the faculty of medicine; in point of quality, it is of secondary rather than university grade. The instructors are, indeed, men holding high academic posts,—some, like the late Professor Curie, at Paris, men of great distinction; the teaching laboratories devoted to the work adjoin the research laboratories, provided for every professor and every assistant. Nevertheless, the particularity with which the topics to be treated are described beforehand, the close control under which the instruction is carried on, and its limitation to a single year from which all other subjects are excluded, stamp the P. C. N. course as preliminary in spirit and content.

Inclusion in the scientific rather than in the medical faculty has the same effect. It is no accident that the student is trained in the basic sciences by physicists and chemists, rather than by medical men who understand physics and chemistry. The subjects are presented on broad lines and in a scientific spirit, not merely in their immediate instrumental relation to medicine. Despite the brevity due to extreme concentration, an effort is deliberately made, not simply to provide the student with such information and skill as his prospective medical studies require, but to discipline his powers of observation and to familiarize him with the process of scientific thinking. Differences exist as to the wisdom of the undertaking. The medical faculty commonly deplore what they characterize as the too general character of the P. C. N. work; they urge that the instruction ought to be confided to medical men who know what the student will subsequently need. This is precisely the criticism that one would expect, as medical education is organized in France to-day. It is not so much an unanswerable objection to the constitution of the P. C. N. courses, as an indication of the limitations that we shall shortly observe in the outlook alike of the medical sciences and of clinical medicine itself.

The arrangements made for the courses in question are at both Paris and Lyons excellent. At Paris, lack of space at the Sorbonne has led to the erection of an entirely new set of laboratories in the rue Cuvier. The buildings are unpretentious, but well designed on something resembling a unit system. The different subjects follow essentially similar lines. Each is demonstratively presented in the morning lectures of the professor. Five afternoons weekly, from 1.30 to 4.30, are spent in practical laboratory work: one devoted to physics, one to zoölogy, one to botany, and two to chemistry. The class contains some 550 students, divided into groups containing 16 students each; the groups are combined for the amphitheatre demonstrations, while they are distributed for the laboratory work, in such wise that class-rooms, each accommodating some 30 to 40 students, are in charge of separate instructors in every subject. Thus every afternoon, all the subjects are under way, the groups rotating from one to another, day by day. The laboratory work begins with an introductory statement by the assistant, lasting half an hour; after which the students repair to their assigned places for practical work. Individual outfits are provided in botany and zoölogy; in chemistry and physics, students operate in pairs. In the last mentioned subject several different experiments go on simultaneously; but in the end each student must have satisfactorily executed the entire set. In all subjects alike, full notes, drawings, and, where possible, curves are required; the results must be exhibited to and are graded by the instructor before the student leaves the building. Two examinations yearly are held; the final record combines the examination marks and the class-room grades. A general average of 50 per cent constitutes the passing mark; but if the general average falls below this minimum, the entire course must be repeated, for single subjects may not be counted separately. Except that the numbers are smaller, and that the laboratory work takes place in the morning, the lectures in the afternoon, the P.C.N. courses at Lyons duplicate those in Paris. The assignment of the courses to the scientific rather than to the medical faculty is perhaps even more significant than at Paris, for at Lyons,—excepting only the hospitals,—the entire university is concentrated on a single site. The medical laboratories of chemistry and physics—for every medical faculty in France contains both—are immediately at hand, sufficiently commodious, too, to accommodate the P. C. N. students. The location of the course involves, therefore, an unmistakable judgment as to its preliminary, rather than its professional, character, and in that spirit the instruction is imparted.

Unmistakable advantages accrue from this disposition of the problem. It avoids overcrowding of the medical curriculum, it insures painstaking fundamental discipline, it favors the awakening of a general scientific interest by which the student's outlook may be broadened. The objections to which it is liable come from another quarter. Where three laboratory subjects are postponed to a late stage, and there concentrated in a single year, it is doubtful whether students whose previous education has been largely non-scientific really assimilate what they learn so rapidly, and whether the knowledge acquired fundamentally affects their mental attitude. But to these questions it will not be fair to give an answer until medical education proper has been reorganized in France; then only will one be in position to say whether the P. C. N. course can stand the strain to which it will be subjected by a scientific education in medicine.

Before leaving the topic, let me revert to a statement already made. I have said that for centuries medical education lagged far behind medical thought and practice. Can it have caught up now? Medical thinking and medical progress involve chemistry, physics, biology, and mathematics at every stage. The teachers of medicine, who are also creators, are well-trained chemists and physicists. Can they teach at the level at which they work? Not unless their students have been betimes thoroughly trained in the sciences from which medicine has latterly derived so much of its impetus. The defects pointed out in the basis of medical education still keep it from overtaking medical science. Education can in no event include the whole of medical science; but it may well be of the same piece, provided the student of medicine knows chemistry, physics, and biology.

CHAPTER V

THE MEDICAL SCIENCES:[1] GERMANY

Anatomy

Anatomy is the instrumental basis of medicine and surgery. As the general must know the country in which he manœuvres, so the physician must know the site and outlines of the organs he palpates, and the surgeon the topography of the region within which he operates. The subject may be taught directly and narrowly with a view to just such practical application, and countries will be named in which this happens. Germany, however, is not one of them. There it is universally recognized that the effort to teach the student exactly the anatomy that, as physician or surgeon, it most concerns him to know, results invariably in teaching him less than he needs to know and in ways that fail to promote the scientific habit, the development of which is, in the long run, more important than any particular positive possession in the shape of knowledge. For anatomy is not merely a thing to be learned memoriter or to be mechanically mastered by dissection. It is not a closed book or a dead science. Comparative anatomy and embryology have outlawed the notion that anatomy is merely a descriptive science, whose ambitions are satisfied when a painstaking dissector has completed a minute description of what he finds in the course of taking the adult body to pieces. The study must indeed furnish the student with the detailed knowledge of the body which as clinician he requires; but it must also bear a part in his scientific training,—in cultivating his powers of observation, unaided as well as aided, and in training him in the art of inductive inference. Its position in the curriculum makes it of decisive significance in determining the character of medical education. The basic sciences have been only indifferently acquired; anatomy is the one science which all students pursue practically, and which all pursue with considerable elaborateness. A scientific rather than a mere mechanical grounding in it is therefore of crucial importance.

Does the scientific teaching of anatomy sacrifice practical mastery, from the utilitarian standpoint? Assuredly not. It is indeed the humdrum teaching of bones, muscles, and nerves that is at once most limited and least stimulating. The eye too closely intent upon its immediate objects may miss their larger and more important aspects. Indubitably, the student learns anatomy first of all because of its instrumental value; but it does not follow that he needs to be incessantly conscious of this purpose. The tendency nowadays is to break away from the strictly morphological treatment in the training of medical students as well as in the prosecution of research. Morphology is found to be more firmly and more fruitfully grasped when the genetic and functional relations of parts are taken into consideration. Nor does the modern

[1] Anatomy, physiology, pharmacology, pathology, hygiene, legal medicine. I visited the universities at Berlin, Munich, Leipzig, Breslau, Strassburg, Greifswald, Würzburg, Marburg, Giessen, Vienna, and Graz; and the so-called "Akadamien" at Düsseldorf and Köln.

anatomist hesitate to point out pathological changes by way of arousing an interest that may subsequently remind the student in the clinic of a previous experience in the laboratory.[1]

Thus presented, anatomy loses the artificiality characteristic of the rigidly and consistently sustained morphological point of view. For this procedure there is profound justification in the principles underlying the organization of all the sciences. We shall have repeated occasion to point out that the divisions into which the medical sciences fall are not absolute. As knowledge advances, redistribution constantly takes place; for the investigator batters down or displaces the barriers which provisionally separate various domains. Anatomy, physiology, and pathology are not therefore at bottom necessarily exclusive of one another. Such exclusiveness as superficially appears is a matter partly of convenience, partly of individual preference, partly of financial economy. Overlapping and repetition ought to and must occur. Mall has pointed out that embryology was born simultaneously in three departments,—anatomy, physiology, and zoölogy; histology appeared contemporaneously in anatomy, physiology, and pathology; bacteriology flourishes equally in botany, hygiene, and pathology.[2] From the standpoint of teaching, on the other hand, dividing lines are apt to be too sacredly and too long respected,—one of the reasons why teaching finds it difficult to overtake research. Meanwhile, a certain amount of duplication vastly increases the effectiveness of instruction, by making one subject the apperceptive basis of another. Different subjects thus reinforce one another; the several strands of knowledge are woven into a single tissue. The student's grip is more secure; his field of vision more extended, and subsequent experience recalls more varied associations.

For this reason, sharp differentiation is not attempted in Germany even where two chairs of anatomy exist side by side. At Berlin, there are two institutes, one known as the Anatomical Institute, the other as the Anatomical-Biological Institute. Comparative anatomy, embryology, and histology are cultivated in both, as they may also be in the institutes of physiology and zoölogy, if workers find their problems forwarded thereby. Waldeyer urges with great force that in any event histology must be vigorously represented in the department of anatomy, no matter where else it be prosecuted. When the unaided eye and the scalpel have reached the limit of their capacity, the microtome and the microscope must be invoked; for if the anatomist is concerned to understand the structure of the body, it is absurd to confine him arbitrarily to such observation as he can make with the naked eye. The use of the microscope does not alter the nature of his inquiry. It simply enables him to go further, precisely as the scalpel is an improvement upon his fingers.

Anatomy cannot stand still where such a view of its scientific character and relationship prevails. The German anatomical institutes are therefore devoted with equal

[1] See, for example, Tandler's Antrittsrede, "Anatomie und Klinik," *Wiener Klin. Wochenschrift*, vol. xxiii, No. 44.

[2] Philadelphia *Med. Jour.*, April 1, 1899.

emphasis to teaching and research; they begin with the cell, taking in the complete human frame, and often comparative anatomy as well. Is indifference to teaching, even to elementary teaching, the result? An investigator may of course be a poor teacher. So may he be who is utterly devoid of the research spirit. In general, however, the German anatomists are excellent teachers. Devoted investigators though they are, they do not lose sight of the primary purpose for which the medical student acquires anatomy. One of the most distinguished of them writes: "In the first instance, one cannot overemphasize the fact that we professors are as a body appointed by the state to train doctors. We should indeed do our duty but indifferently if we were not profoundly concerned with the advance of science. We are therefore rightly expected to be investigators. But we may not forget that, whatever our responsibility for scientific progress, we are for our young auditors elementary teachers, — we anatomists, above all. Hence, the first duty of the anatomist — to introduce the beginner to the elements of his profession. If the student is overwhelmed with details or with matters of controversy, the important foundations are neglected or appear to him inconsequential. The danger is perhaps increased by the natural tendency of the academic instructor to dwell on points that especially interest him. Of course, he ought not to conceal his own preferences, his own lines of interest; he ought, rather, freely to exhibit them; otherwise he will not inspire his students. But this must never interfere with laying a sound, broad, elementary foundation, theoretical and practical. Thus far, indeed, one might almost say that anatomy is an art before it is a science. Here the student's training proceeds in simple, concrete fashion; here we are elementary teachers in the strict sense. It is not for the moment a question of standpoint at all, — whether genetic, physiological, or comparative. The young student wants to get hold of the naked fact. That is the way, too, in which the seasoned investigator takes hold of a new problem, — in the simplest and most objective fashion."[1]

While the institutes differ in style and splendor, they have practically all been either built or rebuilt in quite recent times. Without exception, they possess capacious lecture rooms provided with modern projection apparatus; dissecting-rooms invariably clean, attractive, and with the requisite adjuncts; class-rooms for microscopical courses; museum, library, and research quarters for the chief, his staff, and advanced workers. The auditorium varies in size from that of Rostock, seating 40 students, to that of Berlin, seating 400, or the new hall at Munich, seating 590. The departmental libraries contain at least current periodicals, important works of reference, atlases, etc. Twenty years ago, when Waldeyer prepared a detailed account for the book on the German Universities, published by the German government for the Chicago exposition, the departmental library at Strassburg contained 1000 titles; that of Königsberg, 2100; that of Berlin, 3000. The Anatomical Museum at Berlin then contained over 8000 specimens; that of Giessen, 1200; that of Leipzig, 3200; there were 10,000 histological preparations at Bonn, over a thousand skulls and skeletons

[1] Waldeyer: *Wie soll man Anatomie lehren und lernen?* (pp. 5-7 abridged). Berlin, 1884.

at Halle. Models and special dissections, cross-sections, corrosion preparations, charts, are always found, and usually in great abundance. At Vienna, the series of preparations on which special studies were made by Hyrtl, Zuckerkandl, and others are preserved with pious care. Every institute has its own photographic outfit, and shop, and several possess an aquarium.

The most recent of these laboratories—that at Munich—is also the most elaborate. It covers an area of 200 by 300 feet, and is four stories in height. Last year it accommodated 2000 students, of whom 900 were engaged in dissecting; 600 attended lectures in gross anatomy, 600 attended lectures in art anatomy, 500 those in embryology and histology; 300 were enrolled in practical classes in histology, 200 in classes for histological technique. Equipment is at hand for the preparation of all kinds of anatomical specimens, sections, skeletons, charts, photographs, including X-rays. The building is surmounted by a huge dome, in which the classes in histology are held.[1]

Considering its scope and activities, the staff of the Anatomical Institute is surprisingly small. There are two chairs at Vienna, Munich, and Berlin; elsewhere only one. The staff of the first Anatomical Institute at Berlin consists of professor, two prosectors, seven assistants (one a volunteer), and the important inferior help, a house-inspector, a preparator, three helpers, and a mechanic,—making a total of sixteen persons; that of the second, the Anatomical-Biological Institute, consists of four instructors, with four helpers. The Leipzig institute, in which 400 students dissect, has a staff of five, with six helpers of different kinds; 250 students work in the subject at Marburg in an institute conducted by a professor, with two prosectors, two assistants, and two student assistants; 150 at Erlangen, under a professor, a prosector, and two assistants; about 100 at Rostock, in an institute whose staff includes professor, prosector, a student assistant, a technical assistant, and two helpers.

The teaching force is undoubtedly hard pressed, and an impression of overwork is generally prevalent. But in any event, a relatively small staff suffices,—in the first place, because of the wide employment of the lecture method; in the second, because in actual dissecting as well as in private study the student is expected to help himself. As to this, he is in practically the same position as the advanced student—no control of his movements, attendance, industry, is anywhere attempted. Only in one or two subjects—dissecting and the practical work in physiology—is his work checked up at all; even then, the supervision is far from exacting. The German theory holds that the disciplinary period ends with the *Gymnasium;* that, a profession once chosen, responsibility must rest squarely on the individual. "No pedantic methods can be utilized," says Rückert, in speaking of the immense Munich establishment; "a spiritless drill would conflict with the principles of academic teaching by depriving workers of their self-reliance. Rather, time and stimulus must be given them to

[1] The institute is described fully in *Die neue Anatomische Anstalt in München*, by Dr. J. Rückert (Wiesbaden, 1910).

follow out topics in the literature, atlases, etc., or to put questions to the instructor."[1] Teaching on these lines is both feasible and effective in the smaller institutions, where a professor, who knows his students, can casually afford them the requisite direction and stimulus without making of himself a teaching drudge; in the large universities, as the courses are now given, the outcome is more dubious. We shall see that in them the wholesome German theory is in danger of being defeated by mechanization, lack of guidance, or by the passivity of the student, inured to excessive lecturing.

In the subjects included in the scope of the German Anatomical Institute, human anatomy, comparative anatomy, embryology, histology, elementary courses, and advanced opportunities are all offered. Before admission to examination, the student is required to earn certificates showing attendance on general lectures for one semester, dissection for two semesters, and practical histology for one semester. As a matter of fact, few students adhere to the minimum, especially in the matter of lecture courses. An important subject, like general or special anatomy, is taken twice, sometimes oftener. Over and above these required courses and exercises, elective courses are offered in comparative vertebrate anatomy, anatomy for non-medical students, comparative and experimental embryology, neurology, anatomical technique, anatomy of the sense organs, anthropology, etc. The great variety of courses thus offered provides every desirable kind of opportunity. Having once procured the indispensable common basis, the student may then strengthen himself wherever he is weak, or develop himself further where he is interested. The offerings at the smaller universities are less rich, but the principle is the same. For example, Greifswald offered in the winter semester, 1910–1911, lectures in systematic anatomy, dissections, topographical anatomy, special dissections for dental students, embryology, special research courses for advanced students, Darwinism, osteology, histology, and anatomy of the nervous system. The lectures, dissecting classes, and histological courses are largely attended: the amphitheatres at Berlin, Munich, and Leipzig are filled to overflowing; at Marburg, the lectures on systematic anatomy are heard by 100 to 150 students, at Erlangen by 75; histological classes enroll 300 at Berlin, 80 at Erlangen, 120 at Marburg. But the elective classes are very small; there contact between teacher and students is close,—and that, too, in the great centres as well as at the small institutions.

The situation in regard to the supply of anatomical material has in recent years been decreasingly satisfactory. The laboratories receive the unclaimed dead from hospitals and prisons,—the former, however, only after post-mortem. The number of complete bodies is altogether inadequate; even with the addition of the autopsied cadavers, it barely suffices. Time was when the supply was so abundant at Vienna, for example, that students could work with fresh material, and every individual might twice dissect the entire body. Nowadays, the student is fortunate who dissects an entire preserved cadaver once. The law in Saxony gives the Anatomical Insti-

[1] *Neue Anatomische Anstalt in München*, p. 48.

tute at Leipzig the bodies of suicides and unclaimed dead in all Saxony. An allowance of one body to each student would be held satisfactory, but the supply falls short of this by almost 50 per cent. The scarcity afflicts all universities, large and small alike. Only thirty cadavers are available at Erlangen, though twenty more are turned over later by the demonstrator of operative surgery, for dissecting classes aggregating 140 students; at Rostock, forty adult and ten infant bodies must suffice for 110 workers; at Marburg, fifty to sixty bodies for 220 dissectors. Democratic sentiment and clerical influence appear to be mainly responsible for the shortage. Among the humblest workers, burial societies have been organized which, in consideration of trifling monthly dues, promise the friendless laborer a funeral quite out of proportion to anything he has had in life. The prospect of having a "handsome funeral"[1] has become the ambition of even the abjectly poor.

The teaching methods employed are the demonstrative lecture and the practical exercise; of didactic lecturing and text-book recitation or drill, the German university instructor knows nothing. The general lecture course conducted daily throughout the semester by the professor traverses the entire field. Charts, lantern projections, museum specimens, are employed illustratively. Despite the argument already quoted in behalf of observation and participation by the student himself, the lecture is beyond question everywhere overdone in Germany. It does indeed throw the responsibility of learning on the student; but it gives him no effective assistance toward achieving his purpose, namely, the practical mastery of anatomy. Of the futility of lecturing there is surprisingly little suspicion. Lectures attract the student like a mirage. His first course in anatomy disappoints him. He takes a second, not infrequently a third; but the goal is not thus to be attained, no matter what ingenuity is employed in illustrating. At Munich, as the professor lectures, an assistant dissects beneath a reflectoscope which throws upon a huge screen an enlarged image in perspective: the student thus sees in normal position and relation every structure described or discussed. At the close of the hour he has a chance to examine for himself illustrative models, cross-sections, and drawings, in a students' collection always accessible. But the net result to him of this demonstrative instruction is nevertheless slight; the waste of time, very great. As a matter of fact, a knowledge of the bodily parts, viewed separately, together, and topographically, can be built up only by dissection, reconstruction, close study of models, etc. There is perhaps no subject in which mere elucidation will accomplish so little.

In Germany, dissecting takes place in the winter semesters, histology occupies the summer. The professor is himself chief of the dissecting-room, which is open and in active use daily from nine o'clock until five. No matter how large the class, he glides freely from table to table in the endeavor to keep in touch with students and assistants. Waldeyer at Berlin, Hochstetter and Tandler at Vienna, themselves direct and take part in this fundamental work; of course, the professor at Marburg, Graz, or

[1] "Eine schöne Leiche."

Rostock is his own chief of the dissecting-room. Advanced workers are not numerous, six or eight at any one time in so important a centre as Berlin. They may be physicians working at problems appropriate to a special interest, or investigators pursuing a purely scientific quest. Noticeable are the cordial welcome extended to the competent student, the rigid barrier that shuts out the incompetent, and the utter indifference of the professor to their numbers. The large responsibility in the selection and working out of problems that falls to the student himself effectually deters those incapable of "paddling their own canoe." Thoroughly characteristic is Mall's account of His: "His was never anxious to have pupils. When I knocked at his door at first, I was turned away, but after appearing a number of times, was finally accepted. When he set a problem it was concisely stated; he outlined the general plan by which it was to be solved. All the details were left to the pupil, and it annoyed him to be consulted regarding them. He desired that the pupil should have full freedom to work out his own solution and aided him mainly through severe criticism."[1]

In this respect, small and large universities do not differ. In both, the professor and his assistants are accessible; in neither is the student policed. He is of mature years, and has been severely trained with a view to a university career. His fate is in his own hands. Subject to the protection of the public by a sufficiently rigorous examination,[2] the argument in favor of such methods at the university is irrefutable. The difference between small and large universities is therefore not fundamental. The student at Rostock is not held down by his teacher; the student at Vienna cannot be.

Practically, however, there is a marked difference in favor of the smaller institution. Although the theory is in both cases the same, it is inoperable in the larger schools. The student is expected to do his own work; and occasional contact with an inspiring teacher is supposed to constitute the only necessary directive force. This is not wanting at Marburg, Giessen, or Würzburg; it is highly precarious at Berlin, Munich, and Vienna. While undoubtedly really vigorous students get abundant opportunity everywhere in Germany, it is questionable whether any of the large universities are in position to do justice to the ordinary individual. If the production of a small number of highly trained anatomists were the sole or the main object, one could urge no objection. For even in the most crowded centres a capable individual readily demonstrates his presence. According to Ostwald's criterion, the able man is he who does more than is demanded of him. In Berlin or Vienna, while doing his required modicum with several hundred others, he will perhaps have no way of disentangling himself from the mass. But at the point where the ordinary student stops, he goes ahead. One of several hundred students before, he is now one of half a dozen in an elective or advanced course, or as volunteer assistant.[3] Thenceforth, no matter how large the university, it is small for him. He comes into close contact with his teacher precisely when such contact

[1] *American Journal of Anatomy*, vol. iv, No. 2, pp. 150, 151.

[2] See chapter x.

[3] So-called "famulus."

is of the utmost moment in his development. The necessity, however, of training doctors in considerable numbers makes it important to provide in anatomy conditions favorable even to the effective training of mediocrity in the elements of the subject. The three great schools — Berlin, Munich, and Vienna — solve this problem differently. At Munich 500 students dissect at once, in the clover-leaf hall, one hundred in each alcove. Three students work at each table. What with scantiness of material and the small size of the staff, the professor's demonstrations are forced to play an inordinately important rôle. As already described, the part under dissection is projected on a screen and further dissection is carried on by an assistant, who thus keeps pace with the lecturer's discussion. Everything is told to the student; nothing is left to the imagination. In histology, 150 students attend a so-called practical course. They sit in concentric half-circles in the splendid dome, the professor in the centre. Every individual, including the instructor, receives the same slide. The professor expounds, the students follow. When the exposition is concluded, the students make sketches, afterwards hastily inspected by the professor. A student who has failed receives additional explanation. Without rising from his seat, the lecturer can press a button and darken the hall in order that an enlargement of the section under consideration may be projected on a screen. Of course no one need be satisfied with the mechanical instruction thus received; for a willing student may do as much more as he pleases. The fact remains that most students are satisfied, and get nothing else. Munich thus copes with numbers in anatomy by means of mechanical methods applied to large masses. Vienna, on the other hand, is frankly overwhelmed by them. Its two chairs divide over 1000 students, of whom last session 460 were in their first semester. With a staff of three assistants and seven demonstrators, four of them unpaid, and two dissecting-rooms each capable of containing about 125 students, a professor is supposed to train over 500 students, most of them beginners and practically all without previous scientific experience. It is an impossible feat. "Vienna is a monster," remarked one of the professors engaged in it. The professor continues to circulate through the room, but at best he glances and passes on. Only when he encounters an anomaly, does he pause long enough to afford the assistance required.

In Berlin, the physical accommodations are more nearly adequate. The students in practical anatomy work in four capacious rooms, each containing 50 students in charge of an instructor. Dissecting is organized as follows: twice weekly, parts are distributed to students whose names have been posted. All those who receive the same part betake themselves to the assigned dissecting-rooms, where an instructor gives a general explanation and sets them to work. From time to time the students exhibit their results, are orally quizzed, and are credited by the instructor in the little account-book kept by each individual for the purpose.[1] For histology, the class is arranged in

[1] For detailed account, see Waldeyer: "Der Unterricht in den anatomischen Wissenschaften an der Universität Berlin," etc., *Berliner Medizinische Wochenschrift*, October 10, 1910.

three divisions, each of which is subdivided into groups of ten, with its own demonstrator. The necessary explanations are made to these small groups; once weekly a résumé is given to the entire class. At each practical exercise at least one complete preparation is made by each student. The course rooms are open for voluntary application daily from 9 till 5 o'clock, and it is stated that perhaps one-third of the students make diligent use of this opportunity.

Whether medical education is possible on the grand scale without sacrifice of its scientific character remains yet to be demonstrated. It may be that it is partly a question of organization, partly a question of adequate provision. Given subdivisions enough, each fully officered, 1000 students can perhaps be trained as readily as 250. Even so, the increase of administrative detail may exhaust the strength of departmental heads. We have already learned that students will throng in large numbers to great cities. If multiplication of departments prove ineffective, duplication of institutions remains as a possible solution. Such duplication on anything else than a university basis leads at once to highly objectionable competition; but where university ideals and conditions are firmly established, it may prove the only means of avoiding university monstrosities.[1] Thus far, in any event, the equipment and organization of the larger institutions have not kept pace with their increase in enrolment. The equipment and organization calculated to handle the smaller, have been forced to suffice for the much greater, number. On these terms, large schools go far to belie the fundamental principles of scientific training. For, while the student can thus be brought to acquire information, he gains nothing in reflective power. His education is acquisitive and imitative. The elimination of effort and error reduces his processes to the level of automatism or mechanism. "It is eternally true," remarks Waldeyer, "that we really know and hold as an inalienable intellectual possession only what we have gained by our own effort with a certain degree of actual exertion."[2] I have pointed out that the scientific teaching of anatomy is necessary partly because the student has previously had no scientific training. To the anatomist, then, falls first the responsibility of training him to observe, to reason, to act. Hence the importance of teaching the medical student anatomy in scientific anatomical institutes, which the Germans clearly recognize. But what becomes of this argument if the instruction deteriorates into mass instruction in which the student earns the requisite certificate by following the motions of his leader? Scientific medicine imposes an increasing strain on the student's initiative. Meanwhile, the preliminary education of the medical student remains in most cases what it was. Mechanization in anatomical teaching amounts, therefore, to stultification. Nor is this situation wholly met by the indisputable fact that a capable and enthusiastic student can achieve as much more as he pleases.

[1] See chapter viii. [2] *Berliner Medizinische Wochenschrift*, October 10, 1910, p. 17.

Physiology

Not until comparatively recent times has physiology won its independence of anatomy.[1] At Leipzig, to take a characteristic example, the two chairs were separated only when, in 1865, Ludwig began his remarkable career there. Weber, his immediate predecessor, had carried out his important researches in experimental physiology in a few small rooms belonging to the Anatomical Institute, of which he was the head. In the provisional quarters first placed at his disposal, Ludwig had a single assistant, representing histology. With the erection of a new laboratory, he created physical and chemical divisions, out of the latter of which a practically independent department of physiological or bio-chemistry has developed in many universities;[2] histology, on the teaching side at least, now usually falls to anatomy.

In Germany, the physiological institute is the counterpart of the anatomical institute: it contains a large lecture hall, conveniently equipped for demonstration with gas, water, and electrical attachments, blackboard, projection apparatus, etc. The inevitable preparation room adjoins, its cupboards full of physical and chemical apparatus, models, charts, etc. In close proximity are the large demonstration rooms, in which practical undergraduate courses are held, and the smaller demonstration rooms, to which students repair in small groups: one for electro-physiology, another—with dark room adjoining—for sense physiology, etc. A workshop in charge of an expert mechanic is always a striking feature. The rest of the building—something more than one-half of it—is dedicated to investigation. A complete laboratory would be symmetrically developed on several sides, physical, chemical, and operative. But, as a rule, the laboratories are uneven, emphasizing the approach to physiological problems which most strongly appeals to the chief at the moment. The Berlin institute is organized in five divisions,—operative, chemical, metabolic, bacteriological, and physical. Each division has its separate staff,—a head, perhaps an assistant, and always a skilled helper. The professor is director; to him secretary and mechanic are responsible. The entire personnel includes nineteen individuals. At other universities, the organization is less elaborate: the Munich and Heidelberg institutes have each a teaching staff of four, with three helpers; Greifswald, a staff of two, with one helper. But the absence of a chemical division here, an operative division there, involves in the end no loss to either science or education; for the German student, graduate or undergraduate, migrates freely to the university where those lines of work are cultivated of which he is in search.

Physiology as it is embodied in the university institute just sketched is not limited to human physiology. Though the subject belongs to the medical division, it is there cultivated in its wider bearings. Human physiology is only a special aspect. The

[1] The two chairs had been separate at Breslau from the founding of the university in 1811. They became separate at Marburg in 1848; Tübingen, 1853; Heidelberg, 1857; Berlin, 1858; Munich, 1863; Greifswald, 1872; Giessen, 1891.

[2] At Strassburg and Tübingen, physiological chemistry has its independent chair.

student of medicine is of course concerned mainly with human physiology, as definitely related to his professional object. His instruction, however, takes up the higher mammalian physiology in general, with especial reference to man. Ever and anon the discussion is brought to bear more narrowly on medical matters; but no German ever views his topic in instrumental isolation. To the physiologist, physiology is always a particular aspect of biology,—and of the biological fringe he is always more or less conscious. He presents a picture of function sufficiently circumscribed to be of use to the medical student, but in terms that involve general biological facts and principles. The activities of the least pretentious institute thus range in the form of advanced courses and individual research far beyond the common requirements. At Leipzig, in addition to the general lectures and laboratory exercises, special courses deal with the physiology of the circulation and the theory of life; at Munich, advanced courses are given in metabolism and physical chemistry applied to biology; at Würzburg, in the physiology of nutrition; at Strassburg, in the mechanism of speech and muscle physiology; everywhere, too, special research topics are selected by students after conference with the professor.

The teaching of physiology as part of the medical curriculum takes two forms,—the lecture and the practical exercise. The lectures endeavor to portray the present status of the science by presenting and inductively developing its more important aspects. The presentation is neither merely descriptive nor merely concrete. It is philosophical in the sense that the student is carried through the systematic steps by means of which conclusions have been reached and supported. The German lecturer does not simply purvey facts and laws which his students are to accept on his authority; nor does he endeavor by elucidation and simplification to bring a given subject-matter within the comprehension of immature auditors. Be the topic easy or difficult, elementary or advanced, his exposition is orderly, historical, logical, making a positive demand on the trained intelligence of the student body, a demand which the exacting discipline of the gymnasium has made them ready to meet. The centre of gravity of the instruction falls within this lecture course, not within the practical course, which is distinctly subsidiary. It is urged in defense of this procedure that the foundation thus furnished is really based on experience; the student has observed the fundamental phenomena, and has been taught to draw conclusions from them. What matter if he does not perform the experiments himself? "It does not contribute in the least to my persuasion that two weights are equal if I myself put them in the scales; all that is needed is that I should see their equilibrium."[1]

Of the quality of teaching, what has been said of anatomy may be repeated. The exposition is admirable; it affords a clear, comprehensive, and thoroughly scientific introduction, philosophic in conception and as concrete as convenient illustration can make it. The necessary previous arrangements have been made most carefully; at the proper moment, an effectively prepared illustration clinches the point that has been

[1] J. Rosenthal: *Der physiologische Unterricht*, p. 19 (Leipzig, 1904).

developed. So subordinate, however, is the place occupied by the practical course that a semester or more frequently elapses between the lectures and the laboratory work.

There are two points of view from which the German disposition of the subject must be regarded, — that of pedagogical theory, and that of practical expediency under existing conditions.

Pedagogically considered, the German practice is surely mistaken. Alike in content and purpose, modern physiology is an experimental science. Exposition neither conveys its content nor answers its purpose. In endeavoring to possess himself of such a science in however elementary a fashion, it is precisely the beginner who must needs acquire essential concepts through his own experience: only after terms have obtained vital meaning from experimentation do they become for the first time significant symbols which enable him subsequently to actualize what he has not himself done, to reason with factors that he himself has not disengaged, — in a word, to reap where he has not himself sown. The most brilliant demonstration is in this sense less educative than a more or less bungled experiment executed by the student with his own hands.[1] In a sense, a demonstration deceives: the student who watches its smooth progress from his seat forms no conception of the difficulties involved in the preadjustments. Moreover, follow though he may in thought, he after all sees and thinks only what he is told to see and think. Not only does he acquire no manual dexterity, the acquisition of which is so important; he does not even think independently, — the very capacity on which scientific medicine presumes. The teacher observes and thinks, — the student is passively and unresistingly led.[2] Especially, therefore, at the start, the exhibition of a tracing is a wretched substitute for the experience of making it, even though in the former case the tracing is perfect, and in the latter well-nigh unrecognizable; the more so where, as on an occasion at Berlin, a pulse tracing made by an assistant before the class met was held up to the view of over one hundred auditors, few of them close enough to see it. Indeed, the exhibition in the lecture goes far to deprive the act of making it two semesters hence of educative stimulus and value, by so largely diminishing the element of surprise.

Whether, however, the introduction of the experimental method on a scale sufficiently elaborate to make it the central point of physiological instruction is now feasible in Germany is another matter. Physiological experimentation implies good previous practical training in physics, chemistry, and biology. Anatomy may — though not without deplorable limitations — be a first science; a boy can learn to dissect, even if he has had no antecedent scientific training. But to teach experimental physiology to boys who have never worked in scientific laboratories is a task that wastes the

[1] "It is quite clear that through the student's own experimental activity with all its slips and imperfections, a better and more enduring picture of physiological phenomena is gained than is possible where the student hears about experiments in the course of a lecture or sees a curve on the blackboard." Friedrich von Müller: "Amerikanische Eindrücke," *Münch. Med. Wochen.*, 1907, No. 49. Sonderdruck, p. 7.

[2] "Dabei verhalten sich die Zuhörer passiv, der Lehrer ist es der beobachtet und denkt." J. Orth: *Die Stellung der path. Anat.*, p. 30 (Berlin, 1904).

teacher without greatly profiting the student. The Germans are therefore doubtless right not to attempt it; but they are just as surely wrong not to prescribe a preliminary training that would warrant the attempt.

Here again science and education still diverge. Clinical medicine is permeated by the spirit of physiology, and physiology is an experimental science. A standpoint established in anatomical investigation can be brought over into anatomical teaching; but the standpoint established in physiological inquiry cannot be made active and actual in physiological instruction. The student knows too little and can do too little to permit it. To some extent, medical education continues to suffer throughout from the consequences of this defect, as we shall observe later in dealing with pharmacology and in clinical medicine. In these, as in physiology, the traditional descriptive presentation by lectures still holds the stage, educationally speaking; albeit the most rigorous procedure has been worked out in them on the side of research. From the investigative standpoint, physiology is as highly experimental a science as chemistry. On the teaching side, however, it continues preëminently, even if illustratively, descriptive, just as though it had not broken away from anatomy in order to develop on experimental lines. The student may see or perform a few experiments upon frogs,—the substance of his physiological knowledge is not altered thereby: his conception of such important functions as respiration, circulation, and metabolism is verbal, not functional, for it comes to him as description and descriptive it remains.

The practical course, therefore, in Germany is a thing by itself, and as a rule is still unsatisfactorily carried on. Quite independent of the lecture course, it is often conducted by another instructor and almost invariably taken in a subsequent semester. It does not and cannot furnish the lecturer either basis or point of reference. Consisting as it does of certain exercises specified and minutely described in a syllabus, the practical course tends to be an isolated series of experiments mechanically executed rather than a stimulating and successful application of scientific method to physiological problems. Neither in small nor in large universities is the equipment usually sufficient for any other treatment of the matter. At Greifswald, there were only thirty students in the practical course. But as there are only two or three sets of muscle and nerve apparatus, which students must use in succession if at all, the practical course deteriorates into an informal demonstration, in which the professor or his one assistant does the work, while the students crowd around to look on. The course is practically a demonstration course at short range. When the class becomes twice as large, difficulties arise. The number is too great for the intimate and informal demonstration just described. Equipment, space, and staff are insufficient to allow the entire body, divided into small groups, to be occupied simultaneously with the same experiment. The difficulties arising from the lack of previous experimental training are thus apt to be increased. Where fifteen groups composed of four inexpert students, each in cramped quarters and with an inadequate staff, are engaged in performing a variety of experiments concurrently, the assistants or the more skilful students do a disproportionate share of the work. As the classes grow in size, these unhappy conditions are further aggravated. At Vienna, there are some four hundred students, divided into three divisions of over one hundred each. Each division has one laboratory exercise weekly. On account of the entirely insufficient equipment, the divisions break up into some twenty groups containing five or six students apiece; and these half dozen are supposed to carry out one of the experiments described in the syllabus. The inexpertness of the students, partly due to the absence of proper training in chemistry and physics, and the variety of experiments simultaneously in progress, owing to lack of equipment for any one, tend to convert the exercise into a disorderly and confused demonstration by the professor and his assistants, who go from table to table setting things right and themselves doing the work. At one table a blood count was under way. Twenty students surrounded the table. An assistant started the process; straining to the uttermost, I was not able even to see what he did. Experiments in blood pressure and respiration were in progress at other tables under precisely the same conditions.

At Munich, to escape confusion, the course is highly mechanized. The student enters the laboratory, in which practically the entire series of experiments is already set up, each experiment in triplicate, and, indeed, so set up that the various adjustments are immovably fixed. Experience has taught that it does not pay to leave students the chance to tamper with the instrument. Nut, bolt, and screw have therefore been either riveted or dispensed with. The student has only to "touch" the thing off and the instrument does the rest, whereupon he passes on to the next experiment. What a mechanical toy of this nature really adds to a demonstrative lecture course, it is not easy to say.

At Berlin, the laboratory exercise is preceded by a lecture which takes off its edge. The practicum is announced for the hour from twelve to one; but the demonstrative lecture occupies the former half of the period. What the professor does first, the student subsequently imitates. On the chemical side, the equipment is good; on the physiological side, woefully inadequate. At Marburg, however, conditions are better: there are twelve sets of apparatus, at which the students work in groups of four, so that all members of the class are similarly occupied. The gain in order and coherency is enormous. The exercise can really be led as it cannot be when three or four instructors are overseeing six or eight different experiments at once.

The fact is, that undergraduate physiological teaching occupies now substantially the standpoint of forty years ago. At that time, Billroth wrote somewhat naïvely, in reference to physiology, that "it is of great importance to the entire scientific life of the physician not to be content with merely gazing at the experiments and demonstrations prepared for the lecture; the student must now and then go behind the curtain to see how things are done, occasionally even himself try."[1]

Essentially, this is what the student still does: he now and then goes behind the

[1] *Lehren und Lernen*, p. 84.

scenes to see how things are done; occasionally he himself tries. He does not, however, rough it; and not otherwise can he be hardened. To grasp modern science, the student must be trained to think concretely and experimentally. He must be bred to distrust description. Description as such is indeed a draft on his faith that he must be taught not as yet to honor, if he is going to apprehend function dynamically, as scientific medicine requires. But if, on the other hand, he is to acquire fundamental concepts experimentally, he must face the risks and alternatives that experiment involves. He must not be spared the exercise of intelligence; for where intelligence goes out at the window, mechanism enters at the door. Whether the end be intelligent apprehension or intelligent use, mechanical methods of training are unavailing. If, then, physiology is to be taught as an experimental science, as a science of function, the student must be allowed to run risks, to calculate, to observe, to verify, to conclude. Eliminate risk and the experiment becomes a mechanical toy: it may amuse, it does not discipline. Scientific education is an effort to habituate the student to employ a certain method in obtaining facts. If pulling a string solves the problem, how has he learned to handle himself when a genuine emergency presents itself?

For such physiological instruction as we have in mind, the students must as a body be purposefully prepared; the institutes must be adequately equipped and manned. Only for the small minority who elect to continue their physiological studies are these conditions already fulfilled in Germany. No one of these who wants to perfect himself in experimental physiology lacks the chance; competent students find everywhere hospitable quarters and stimulating direction. They are nowhere numerous, two or three perhaps in the smaller institutes, six or eight in the largest; for these, the professor, and his assistants, every possible provision within the limits of the budget is made. It would not be fair to represent the institute as generally resentful of the necessity for providing elementary instruction; for whatever it undertakes, it does conscientiously. But in this capable minority it obviously flowers. Nor do these necessarily remain physiologists. In the last half century, clinical medicine has obtained its most important recruits from the advanced students and the assistants of the physiological institutes.

Pharmacology[1]

The development of physiology and chemistry as interlocking sciences was bound to result in an inquiring therapeutic mood. For chemistry extricated the active principles of the crude drugs traditionally employed, and experimental physiology created the conditions for accurate observation of their effects. Conflict of therapeutic opinion was general and acrid enough to suggest a test as soon as it became feasible to correlate cause and effect. Tradition ascribed a certain efficacy to, let us say, camphor or sarsaparilla. The "experience" of one man vindicated tradition; the "experience"

[1] Discussed here with the sciences, though by the German examination ordinance included with the clinical branches.

of another went directly against it. Where does truth lie? Organic chemistry and experimental physiology put the pharmacologist in position to determine.

The juncture was also otherwise auspicious: while miscellaneous dosing was still generally prevalent, intelligent practitioners had been infected with nihilistic doubts from two highly divergent sources: the disclosures of the autopsy table brought an overwhelming conviction of the futility of elixirs and extracts to combat, to terminate, or to repair organic changes so profound and destructive; homeopathy, by appearing to demonstrate that minimal are as efficacious as larger doses, hinted at the perhaps frequent impotency of both. The immediate outcome of the nihilistic mood was a wholesome emphasis of physiological therapy. We are, apparently, — so the argument ran, — powerless to cure; but a rational mode of living, in the first place, prevents disease, and, in the second, assists the body struggling for survival to regain its normal course. The new science of pharmacology represented from the start a distinctly more hopeful therapeutic attitude: instead of discarding, it undertook to probe; not content with testing traditional and empirical claims, it ventured the effort to ascertain the physiological effect of drugs hitherto unemployed. Finally, proposing to itself definite clinical and theoretic problems, it sought to create agents capable of coping with them. Its most recent outcome, Ehrlich's salvarsan, is a deliberate effort in constructive therapy.

The critical and constructive science of pharmacology thus succeeded the descriptive science of materia medica in the medical curriculum. A curious reversal of relationship has resulted. The teacher of materia medica described the origin and appearance of roots and herbs, as his own senses informed him; for their therapeutic efficacy he took the word of the physician; he recited what the doctors told him. The pharmacologist has, however, brought the doctors to book. He began by exposing medical error and superstition. He has now become the expert to whom the clinician does or should appeal. Whatever qualifying factors the clinician may need to introduce, — and clearly one cannot leap in judgment directly from the guinea pig in the pharmacological laboratory to the sick man in the hospital ward, — the accurate experiment of the pharmacologist furnishes a definite point of departure. What is perhaps equally important, experimental pharmacology has rescued the physician from therapeutic credulity without plunging him into therapeutic despair. For the undiscriminating confidence of the empiric, on the one hand, and the unjustified negations of the nihilist, on the other, experimental pharmacology has substituted a reasoned and regulated faith that knows where to be confident, where to be only hopeful, and where — for the present at least — to throw up its hands. Science recognizes limits: and while stubborn and unwaveringly assertive here, it confesses itself incapable there. It knows and loves both attitudes, each at the appropriate time.

We are in position now to understand the comparative recency of the pharmacological institute and the limited extent to which the subject figures in required medical instruction. The science itself has been cultivated for a century. In the year following Waterloo, Sertürner, having previously discovered morphine and manufactured it in pure form, at length ascertained its physiological properties; strychnine, codeine, atropine, cocaine, digitalis, were all pharmacologically worked out — the last by the clinician Traube — before the first separate institute for experimental pharmacology in a German university was established at Marburg, in 1867, following the lines of Rudolf Buchheim's laboratory at Dorpat, dating from 1849.[1] A proper building was provided in Berlin for the first time only in 1883. Previously, Liebreich had carried on his researches in a small rented house, lecturing at the university and using as his preparation room quarters serving simultaneously as the seminary for Romance languages. More suggestive still of novelty is the fact that one of the main creators of the science, Schmiedeberg, still occupies at Strassburg the chair to which he was called in 1872. In his laboratory the men were trained who fill the professorship of pharmacology at Göttingen, Halle, Heidelberg, Rostock, Tübingen, and Würzburg.

One is not surprised, therefore, to find that a well-equipped lecture hall, its necessary preparation room, and a collection of crude and refined preparations constitute the sole provision made for regular teaching in pharmacology. The individual experiment, ill developed in physiology, has not yet been attempted in pharmacological instruction anywhere in Germany. An official account of the Leipzig Institute states: "In arranging rooms for practical work, it was assumed that in the chemical and operative laboratories, scientific experiments would be mainly carried on by those who had already attained an advanced stage of progress. These laboratories therefore contain no extensive halls for practical courses, excepting only the hall used in pharmaceutical instruction."[2] The pharmacological institute is thus mainly a research institute. On the chemical and operative sides it is usually well equipped. Occasionally, as at Berlin, an immunity division exists also. At Greifswald, the institute lies in a charming garden in which are grown many of the plants needed for demonstration in materia medica. The staff at Würzburg, fairly representative of conditions at a university of medium size, consists of the professor, two assistants, a mechanic, and helper; it is but slightly larger at Berlin and little smaller at Rostock, for in the absence of practical courses, the size and demands of the institute do not vary greatly. It is no more difficult to set up a lecture to be heard by three hundred students than one to be heard by thirty, and the number of advanced workers is in any case small, varying within narrow limits with the eminence of the professor.

A simple course of lectures disposes of the undergraduate work; it comprises experimental demonstrations in pharmacology and toxicology, what is of practical importance in materia medica, and exercises in prescription writing. Optional practical courses are given: at Berlin, in toxicology, in recent remedies, in advanced experimental pharmacology; at Vienna, in the pharmacology of the nervous system; at Greifswald,

[1] In 1869, Buchheim, having been called to Giessen, established a laboratory there.

[2] *Festschrift zur Feier des 500 jähr. Bestehens der Univ. Leipzig*, pp. 90, 91 (Leipzig, 1909).

in German poisonous plants, etc. These definitely announced courses do not include special researches, the subjects of which are privately agreed on in conference between the director (as a professor is usually called) and the individual concerned. The optional courses even in the largest institutions attract but a very small part of the student body: on the occasion of a visit to an elective practical course for beginners at Berlin, I found five students in attendance.[1]

With this situation the instructors are not satisfied. They perceive that experimental science teaching demands the practical course. A new danger nowadays increases its urgency in pharmacology. The critical pharmacologist has discredited the old wives' tales that kept up the traditional pharmacopoeia. Meanwhile, the enterprising manufacturer is spinning a new superstition: the chemical industry of Germany is aggressively and intelligently directed. It has won admiration and confidence. It has, however, a highly developed commercial side. Only a critical pharmacological sense can enable the practising physician to know when to doubt and how far to believe the sanguine and assertive claims made upon him by the manufacturing chemist.

Meanwhile, as the medical sciences increase in number and importance, it becomes clear that the undergraduate student of medicine cannot do everything. One can concede that the Germans waste time in lecturing and still maintain that in no event can the ordinary medical curriculum be completely representative of all the elements that constitute scientific medicine. The very hopelessness of thorough mastery brings out in clear relief the fact that medicine is scientific, not because of this or that positive possession in the shape of knowledge, but by reason of its adherence to and exemplification of a certain method. It matters little what particular facts the student knows at graduation, for he can in any case know comparatively few, provided intensive training in a few branches has fixed a keen and sound mental disposition. If he has contracted the inquiring habit, if he can detect logical error, if he can use his senses and his fingers, he has been well educated in essentials. He gets such an education by doing a few subjects thoroughly rather than by doing many superficially. By all means let there be a student's experimental course in pharmacology, but it need not be universally required, if at the same time the corresponding course in physiology is properly elaborated. An intensive course in one or the other, as the student may choose, is better than a brief course in both, and such an option is decidedly in keeping with German tendencies. Moreover, the medical curriculum is not a mosaic of separate pieces. Its different constituents are not permanently marked off from one another by sharp unbending lines. Anatomy is supplemented and to some extent retaught in pathology and surgery; pharmacology may be touched again in therapeutics[2] and the clinic. Excellent pharmacological studies come nowadays from the

[1] The classes vary considerably in size according as the semester is just beginning or is drawing to its close.

[2] We shall see (chapter vii) that this subject is undeveloped in Germany, except in special optional lecture courses dealing with particular forms of therapy. See page 186.

clinic; inevitably, where the clinician is so often first a physiologist. The opportunity to acquire the pharmacological point of view does not then terminate with the lecture course which the student is required to hear.

Fortunately, the compactness of laboratory and clinical plant has tended to promote the interaction of clinic and laboratory in Germany. Pharmacology is indeed capable of a pure development; that is, given drugs and animals, an indefinite investigative evolution is possible. In its course practical results will undoubtedly emerge, the more surely, perhaps, if they are not too eagerly desired or too narrowly pursued. Meanwhile, the science would cut itself off from a fertile source of suggestion if it lost touch with the clinic. It is one of the most striking results of German conditions that this does not occur. Physiologist, pharmacologist, and clinician understand and employ one technique. Occasionally, they make a team for the elucidation of a particular problem from every aspect.[1] Oftener, their research products show the clinician making an inroad into pure scientific investigation, the pharmacologist taking hold of a concrete clinical difficulty.[2]

This, finally, is to be remarked in concluding: the essence of scientific training is, I have said, the practice of method. We have found that in physics, in chemistry, in physiology, in pharmacology, the German student practises that method too little; undoubtedly he must practise it more in those lines in which he practises it at all. Meanwhile, let it not be forgotten that he lives in an atmosphere created by that method in its most rigorous and active form. He is taught by men who think and act in no other way. Medical education indeed lags behind medical research. Yet the actual education that the student gets is always better than the education that on inspection he appears to be getting: it is better because of the quality and activities of the men from whom he gets it.

Pathology

I have already had occasion to point out the provisional nature of the various subdivisions of medical study: anatomy, physiology, pharmacology, bio-chemistry, tend under vital handling continually to overlap. The lines between them are conventional, not absolute, and ought on occasion to be entirely ignored. This does not mean that scientists are once more to revert to the encyclopaedic type, that instead of anatomists, physiologists, and pharmacologists, we are to desire a race of cosmopolitan Boerhaaves,—citizens at once of the entire medical world; it does mean that, however necessary minute subdivision of labor may be for purposes of research, and whatever divisions may be adopted out of wholesome respect for human finitude, teaching and practice require that from time to time those things should join which science has, for its immediate purposes, chosen to put asunder.

1 See O. Loewi, "Pharmakologie und Klinik," *Wiener Klinische Wochenschrift*, vol. xxiii, No. 8.

2 An inspection of the contents of the German scientific journals shows the extent to which clinicians are contributors to pure physiology and pharmacology.

As we approach the clinic, the perplexities attending delimitation thicken. How is a definite province to be marked out for pathology? The abnormal like the normal has its two sides, — structural and functional, — intertwined with each other and with the successive pictures of the patient's condition reflected in the clinical record. No single part of this complicated situation can be comprehended, if taken by itself. Morphological, physiological, and clinical elements require to be considered together. In working out a field for pathology, we are therefore warned not to repeat the error made on the normal side when a hard-and-fast line was drawn between anatomy and physiology; for morbid anatomy is unintelligible without frequent incursions into etiology, without constant cross-reference to clinical history and repeated experimental inquiry. Pathology seems, then, to span well-nigh the entire medical curriculum. To understand it, one must have grasped not only the fundamental branches, but the clinical as well. Evidently, the student's pathological training involves in a peculiar way his fundamental training, a certain measure of independent training, and constant thought and cross-reference throughout his subsequent clinical career.

The founder of cellular pathology was acutely conscious of this complicated relationship. Virchow conceived the science as involving both anatomical and physiological aspects, as, indeed, Rokitansky, in general less thoroughgoing and incisive a thinker, had done before him. Virchow's especial emphasis at the moment upon anatomical thinking betokened no narrowness of conception; it was due simply to the pressing necessity just then of getting rid of metaphysical and constitutional notions as to the origin and nature of disease. As long as those vague generalities were entertained, research lacked a foothold. The anatomical postulate facilitated investigation because it asserted that an agent must be discoverable and a particular point of entry ascertainable. Disease has, Virchow urged, a local habitation; not in a region, nay, not even originally in an organ, but in a cell. From a focal cell the disastrous process spreads. The purpose of the autopsy is not only to reveal its ravages in this organ or that, but to locate its starting-point and to follow out its course. Every autopsy must therefore be a complete autopsy, to the end that the next clinical experience of like character may revive the picture of the pathological substratum just uncovered.

Virchow's insistence upon definite anatomical thinking looked, however, to ultimate interpretation of functional disturbance. The morphology, histology, and chemistry of diseased organ and tissue were to him only means toward the comprehension of the causation and course of disease. At the very outset of his career he declared: "The reform of clinical medicine will assuredly be introduced by pathological anatomy, but pathological anatomy cannot possibly complete it, for the dead alone warrants no inference as to the living. If the pathological anatomist refuses to be satisfied with isolated dead material, if he wants to see connections between the *disjecta membra*, he is bound to be simultaneously pathological physiologist."[1] The master-

[1] Quoted by Orth: *Die Stellung der path. Anat.*, p. 10 (Berlin, 1904).

intellect thus always loves to gather together the relevant threads which smaller minds incline to separate. From the first, Virchow conceived his journal as the "Archives" for pathological anatomy and physiology and clinical medicine. Rokitansky had already enunciated a similar view. "Pathological anatomy," he had declared, "applying its methods of observation and investigation to the living body, requires an experimental pathology for the purpose of establishing the conditions surrounding the origin, existence, and involution of the anatomical disturbances it discovers."[1]

In point of historical development, the intention of neither thinker has been wholly realized. For reasons that will be mentioned, the strong emphasis which the anatomical side originally required, determined the channel to which pathology has since then been largely confined. Physiological interest has not been generally active in the pathological laboratories of Germany; with some notable exceptions, the pathology of function has been studied in laboratories of bio-chemistry, pharmacology, bacteriology, and in medical and surgical clinics, rather than in pathological institutes. In Austria, a somewhat different line has been taken: experimental pathology has there so far established its importance as to win a dangerous degree of independence.

Despite the absence of the experimental or physiological side, the pathological laboratory in both countries fully conforms to the scientific conception that converted a hospital dead-house into a university institute. In the first place, it is important to note that in becoming a university institute, the pathological department did not in the slightest degree disturb its relation to the hospital. The professor of pathology holds a university chair, which includes the post of pathologist to the hospital in which the university clinics are conducted. The professor of pathology and the hospital pathologist are in Germany one individual,—never two,—and he has one work place,—never two. To the German mind, division of this function into two parts, centred in different individuals, or located in two places,[2] is simply unthinkable. We shall soon learn that the hospital may be variously related to the university:[3] like the university, it may be the property of the state; or it may be the property of the city leased for educational purposes to the state; or it may even be in part or whole private property. But whatever be the legal relationship of hospital and university, a pathological laboratory is planted on the hospital grounds and the professor of pathology in the university is ex-officio its chief, with as complete freedom of action in his domain as the professor of Greek enjoys in his seminary room. At Munich, for example, much of the clinical teaching of the university is conducted in a municipal hospital. The pathological laboratory, however, was erected by the state, its head, the university professor of pathology, being ex-officio pathologist to the municipal institutions on the left bank of the Isar; as a matter of course, he is in the same relation to the clinics that are the property of the university, all autopsies being per-

[1] Quoted by Paltauf: "Die allgemeine und experimentelle Path.," *Wiener Medizinische Wochenschrift*, 1900, No. 51.

[2] See chapter vi. [3] See chapter vii.

formed by him in the pathological institute. Equally enlightened coöperation between a hospital that belongs to a municipality and a university that does not takes place at Leipzig. The city furnished the land; the university erected the building and appoints the professor. The pathological institute of the university agrees to perform for the municipal hospital, on whose grounds it is placed, all the functions that properly belong to a laboratory of this character.[1] A compact defines the further relations of the parties in interest down to minute details. The members of the municipal hospital board, the administrative head, and the official inspector are privileged to enter the rooms of the institute only when no work or teaching is in progress; the university has to pay the municipality at full tariff prices for gas and water consumed. Every provision of the agreement frankly aims to promote complete scientific and educational freedom and responsibility. It is interesting to be told that these ideal conditions have not always prevailed. The city and the university have both had to learn how to administer the joint institution: they have long since mastered the problem. Under these circumstances, the precise legal status of the pathological institute is now a matter of no educational importance. There is no occasion to remember that the hospital is a municipal institution in which the state enjoys teaching privileges, while the pathological institute is a university affair on municipal territory. The pathologist has full and free scope to do what and as he pleases. Autopsies he performs as a matter of course; experimental studies he carries on as far as equipment and budget allow; and he has the fullest access to the clinical records of the hospital, so that he is as secure against detachment as he is against poverty.

The close connection of institute and hospital, which is indispensably necessary in the case of pathology, the Germans have correctly perceived to be of fundamental importance in other subjects as well. The medical faculty is an organic whole. Anatomy cannot be completely severed from physiology, physiology from pharmacology, pharmacology from pathology. At any time, of course, anatomist, pharmacologist, or pathologist may for specific purposes cut all his communications; he may abstract from all other phenomena. But what research divides, teaching and practice unite; the subject that is for a special purpose detached at one point touches or interlaces at a dozen others. There are in Germany, therefore, no half schools, teaching anatomy, physiology, and pathology only;[2] no divided schools, teaching the subjects just mentioned in one city, while the hospital is located in another; no scattered plants,[3] the width of the town dividing the pathologist from his source of supplies or his proper field of action. In the heart of the great city of Berlin, spacious grounds have been procured for the Charité and the medical laboratories. Physically and geographically, the medical plant is a unit, pathology at its very centre. The huge Vienna school is

[1] As at Munich some of the clinics belong to the university; their autopsies go to the Pathological Institute excepting only those of the children's clinic.

[2] Chairs of physiology and anatomy exist at Münster, which has no medical faculty.

[3] Such as Paris, for example. See chapter ix.

amazingly compact. Space for laboratories not dreamed of when Joseph II laid out his great Krankenhaus has been procured in its vicinity for anatomy, physiology, and pharmacology as they developed: pathology guards the exit. The influence of geographical integrity is incalculable: suggestive intercourse of a most stimulating kind results under conditions in which, as I can testify, the professor of pharmacology leaves his laboratory to attend the opening address of the newly called professor of ophthalmology, and afterwards detaches himself from a guest in order to canvass a scientific proposition with a group of physicians and surgeons. In the effort to preserve unity of plant, great outlay has at times been necessary. The smaller universities, busy for the last two decades in gradual reconstruction, have profited by experience, acquiring large tracts on which, one at a time, institutes and clinics are being gradually rebuilt. Decided impatience is manifest where, as at Giessen and Marburg, reconstruction is not yet complete. Where the perfected plan still leaves five or ten minutes' walk, as at Vienna, between the hospital and the laboratory of experimental pathology, the break is lamented as an organic defect.[1] At Graz, something like dismay prevails, for new hospital plans have been drawn, and nothing has been said as yet of new institutes on the same plot: except, of course, pathology,—unthinkable otherwise than as part of the hospital plant.

A pathological department requires, first of all, a sufficient supply of autopsies. Fortunately, the attitude of the authorities and of the public toward the post-mortem is highly enlightened. Managers of non-university hospitals connected with universities realize that the interests of science and the interests of the public are in the long run identical. The autopsy satisfies the interest of the pathologist; at the same time it assists the clinician to understand and to cure disease. This holds equally of teaching and non-teaching hospitals. Every possible precaution is therefore taken by way of obviating objection on the part of the family to the post-mortem: the relatives are tactfully handled, the body is neatly prepared for burial. The institute invariably contains a chapel in which the rites are conducted with scrupulous deference to the feelings of those concerned. Very rarely indeed is offense given or taken. Where conditions are so generally favorable, it is difficult to discriminate; but Vienna probably deserves the palm, for there, with singular intelligence, it was provided, on the building of the Allgemeines Krankenhaus late in the eighteenth century, that as a matter of right and duty every death must be autopsied; the department has legal right to retain organs for subsequent study. Every person dying in the wards comes as a matter of course to the pathological institute.[2] The rare objections are easily pacified. In the German Empire, the consent of the nearest relatives is usually required, and almost as usually obtained. The Leipzig compact above mentioned stipulates that immediately after verification of death by the physician in charge, the body must be carried to the pathological institute: if death has taken place between

[1] The clinic furnishes "Anregung und Anwendung," said Professor Paltauf.

[2] Guy's Hospital, London, has always made this stipulation, too. See page 128.

midnight and four P.M., the body cannot be autopsied till the morning of the next day; if death took place between four P.M. and midnight, autopsy cannot be performed till the afternoon of the following day. But this delay may be waived with the consent of the nearest relatives, in their absence beyond range of communication, or in the public interest. In general, autopsy is carried out unless the hospital administrator, at the instigation of relatives, forbids in writing. At Munich, substantially a similar routine is followed: autopsy takes place as a matter of course unless the contrary is definitely requested. Silence on the part of the relatives gives consent.

The amount of material that thus comes to post-mortem in large cities is enormous, and even in the smaller, quite adequate. The Allgemeines Krankenhaus at Vienna furnishes the university more than 2000 post-mortems a year. The supply being thus ample, the right of autopsy is occasionally waived; in such cases, no relatives appearing, the body may be sent to the anatomical institute or used for instruction or examination in operative surgery. At Berlin, from 1300 to 1400 post-mortems are annually available at the Charité,[1] of which perhaps 100 unclaimed bodies are subsequently sent to the anatomists. At Munich, 1200 post-mortems a year are made in the institute; five were made on the day of my visit. Perhaps 30 are annually refused, but this number is counterbalanced by private autopsies made at the request of relatives or physicians. Leipzig furnishes an admirable illustration of successful education of the public. In an interesting historical account of the evolution of his laboratory,[2] Marchand notes that in the twenties, some 12 to 15 post-mortems were made yearly; in 1879, there were 657; from 1900 to 1907, the figures rose steadily as follows: 1018, 1139, 1160, 1213, 1258, 1352, 1383, 1531. Refusals, though increasing somewhat in absolute number, have never been considerable. During the same years they ran as follows: 64, 85, 86, 112, 127, 164, 179, 188.[3] In Breslau, the university has two sources of supply: its own hospital, of recent origin, to which the university professor is pathologist as matter of course; and an additional institution, to which an assistant to the professor of medicine is now prosector. The following table shows the amount of material available:

Year	*University Hospital*	*Allerheiligen Hospital*
1901–1902	373	807
1902–1903	424	812
1903–1904	419	719
1904–1905	462	602
1905–1906	487	715
1906–1907	447	871
1907–1908	534	1038
1908–1909	570	1077

[1] This is by no means the full supply of material at Berlin. See below, page 100, note.

[2] *Das pathologische Institut der Universität Leipzig*, pp. 5, 9 (Leipzig, 1906).

[3] *Festschrift der Universität Leipzig*, pp. 60, 61 (Leipzig, 1909). As the children's clinic makes its own autopsies, these are not included.

The percentage of refusals at Breslau is decreasing: 9.3 per cent, 8.01 per cent, 6.6 per cent in three successive years in the University Hospital; 29.5 per cent, 12.4 per cent, 10.2 per cent in the years 1905, 1907, 1908, respectively, at the Allerheiligen Hospital. At Würzburg, about 270 autopsies are made annually in the University Institute; fresh material from as many more made outside by an assistant of the professor is available. At Strassburg, the weekly average is 25 autopsies. At Greifswald (a town of about 24,000 inhabitants, where there are 218 students in the entire medical course), there were 307 post-mortems in 1908–1909, 263 in 1909–1910; 954 specimens, surgical or other, were contributed to the institute in the former year, 838 in the latter. At Göttingen (34,081 inhabitants, 280 students of medicine), 295 post-mortems were done in 1909, 1272 specimens were sent in. At Marburg (20,136 inhabitants, 396 medical students), 187 autopsies were made in 1909, 960 specimens sent in, and fresh material came from Frankfort, Cassel, and Gross Lichterfelde. At Giessen (28,769 inhabitants, 148 students), there are 350 autopsies annually.

Nor does the wealth of the pathologist excite the envy of the anatomist or the professor of legal medicine; for it is recognized that their supplies have definite and different sources. The autopsy is the necessary final step in the elucidation of a clinical problem. It satisfies a legitimate purpose, at once scientific and practical. As a rule, the body that comes to autopsy could in no event reach the anatomical institute. In the cases in which this might be its destination, the pathologist may, as at Vienna, send it there unopened; he certainly will, after the post-mortem.

The pathological institute usually occupies a building all its own, but at Strassburg a huge structure serves for both anatomy and pathology, and at Leipzig a wing of the pathological laboratory is devoted to legal medicine. In content and arrangement there is no essential variation. Separate rooms are provided for the reception of bodies, for their proper preparation for burial, for their inspection by relatives, and for funeral services. The consideration for the sensibilities of those involved indicated by these arrangements doubtless has had much to do with the almost total disappearance of prejudice against the post-mortem.

The autopsy room itself is invariably large, well lighted, and admirably ventilated; it contains revolving tables, usually of marble, varying in number according to need, there being six at Leipzig, for example. Long tables for the exposure of fresh material to examination by students are ranged along the walls. Adjoining rooms serve for quick histological work, for photography, etc. In easy reach are the various lecture and course rooms, each with its proper equipment, the former invariably containing projection apparatus; the preparation room adjoins, with such apparatus, charts, etc., as are required for the regular lecture course. Space is provided for investigation in one or more of several directions, anatomical, bacteriological, chemical, and operative. A working library is of course at hand;[1] and a steadily growing collection, gross

[1] Its appropriation is small, only 300 marks a year at Berlin, but it is supplemented by the journals received by the members of the staff.

and microscopical, beautifully mounted,—often in the natural colors,—indexed, and labeled so as to refer readily to both clinical records and autopsy protocols, forms an epitome of the activity of the institute from its founding to the present day. Virchow rightly denominated the collection the "Archives" of the pathological laboratory. Many of these, representing a special interest of the director, are, like Von Recklinghausen's collection of bone-disease at Strassburg, impossible of duplication and of priceless value in consequence. To prevent needless expansion, renovation of the museum is continuously in progress; older specimens are discarded to make way for superior exemplars more perfectly preserved. None the less, a precious nucleus of rarities goes back to the beginning of the collection. On the rebuilding of the institute at Leipzig, 2532 of the older preparations were retained; since 1900, 3628 new specimens have been added. The collection at Marburg numbers fully 6000 specimens. Intelligent hospital routine, teaching, and research are thus all promoted by practically the same features of institute construction and equipment.

The organization of the staff once more bears all three in mind. An institute of such scope is a complex affair, requiring division of labor. To teach and to conduct frequent autopsies already taxes the strength of one man. The working-up of material from several points of view, and the experimental determination of doubtful points, demand relatively large staffs, with considerable differentiation. The Berlin institute comes perhaps nearest to ideal completeness in its internal arrangements; there separate divisions, each with its own head immediately responsible to the director, exist for anatomy, histology, chemistry, bacteriology, experimental pathology, and the museum. Each division chief has his own helper, and, the budget allowing, a paid assistant,—not very well paid, however. There are, besides, volunteers and advanced students, the former helping in all the routine of the laboratory, in teaching, and in research. They vary in number from one to four or five. A chief and six assistants would thus man a complete pathological institute on an elaborate scale. Needless to say, few institutions are so completely equipped. As a rule, the staff is about half as large:[1] it consists at Munich of a professor and three assistants; at Leipzig, of professor and four; at Würzburg, of professor and three; at Erlangen, of professor and two; at Marburg, of professor and one. The great number of autopsies necessarily restricts most of these laboratories to pathological anatomy and histology, to careful work in which subjects, teaching and research are mainly limited. Current conditions in Germany, as I have already pointed out, thus emphasize the anatomical aspect, to the disadvantage of the physiological and the experimental. At Berlin alone is the operative side represented. Elsewhere, the burdens that might in part be borne by experimental pathology fall to physiology, pharmacology, bacteriology, and experimental medicine and surgery. Medicine as a whole need not necessarily suffer, but pathology indubitably does.

The difficulty involved in the complete or symmetrical organization and differen-

[1] It is to be understood that helpers and mechanic never fail.

tiation of a department is one that goes deep into the constitution of modern science. A certain field must be subdivided. Time was when it could be roughly partitioned between several non-competing, mutually exclusive jurisdictions. The several jurisdictions now encroach on one another; and what is more, superior jurisdictions have been erected laying hold for this purpose or for that of previously independent estates. The complications of federal political organization are trifles compared with the complexities of scientific organization and differentiation that come about. It results that the scientist must perforce abate his pretensions to completeness, and realize the strictly provisional import of such differentiation of subjects as is at a given moment in vogue. If "chairs" in the university are taken to represent relatively stable lines of approach, then anatomy, physiology, pharmacology, and pathology are far enough apart in interest and point of view to be perhaps permanently differentiated. Other points of view may get full recognition within these subdivisions, or by cutting across several of them, without attaining absolute independence. The tendency to erect independent departments involves serious dangers, since there is no knowing in advance when a point of view, fertile for the moment, should be discarded for another still more so. It is, however, favored by the inclination of the less capacious minds to domesticate themselves snugly in their own compartment. Unhindered, they would, like the mediaeval state builders, carve small bits from each of several dukedoms, to make principalities for themselves. Fortunately, the policy of subdivision breaks down of its own weight, because there is no end to the length to which it might be carried.

Experimental and physiological pathology looks like a subject of this sort. It supplies a link between pathological anatomy and the clinic. The pathologist sees on the autopsy table the final results of disease; the clinician sees reflected in symptoms the progressive steps of structural change which he cannot himself observe. By experimentally reproducing disease in animals, structural and functional alterations can be compared at every successive step. The pathological department that lacks an experimental division remains on a descriptive basis. But, on the other hand, the clinic that foregoes animal experimentation is confined to empirical procedure.

Physiological pathology will therefore necessarily be cultivated in several places,—in pathology, pharmacology, bacteriology, medicine, and surgery. It cannot get a separate establishment along lines comparable in respect to clearness with those on which anatomy and physiology have been built up. No definition of experimental pathology that rightly characterizes Stricker would wholly exclude Traube, clinician, Billroth, surgeon, or Cohnheim, pathologist. The obvious inference is that while experimental pathology is a necessary part of a pathological institute, it is not only that; for it represents the application of physiological or other methods to problems that may turn up indifferently in any one of several places. If, then, it reaches the status of a chair, its connections with the anatomical-pathological institute on the one hand, with the clinic on the other, must be maintained unimpaired. It may under such circumstances become practically a chair of experimental medicine,—*a* chair, not *the* chair, for under existing conditions every teaching post of medicine or surgery must be more or less so. This is precisely what has happened at Prag, where a lucky historical accident gave the incumbent control of a small number of beds.[1] Elsewhere, particularly at Vienna, independence of pathological institute and hospital alike is regarded as a serious limitation.[2] When the subject gets the comparative isolation of an entity or "chair," it suffers from it. When, on the other hand, it gets the facilities it needs, it ceases to constitute a single logical division, for the same facilities, directed to different problems, reappear in each of several places.

Pathological-anatomical institutes of the type described exist generally throughout Germany, not only in connection with teaching hospitals, but as part of a complete general or special hospital. The non-academic hospitals of Hamburg, Frankfort, Düsseldorf, Köln, and Berlin are in this respect no whit inferior to the university hospitals above mentioned. Their modernity of construction, elaborateness of equipment, and productive output have to be reckoned with in the effort to understand the vigor with which the subject has been prosecuted in Germany. These institutions are often used for teaching purposes. Frequently, too, if situate in university towns, the prosector of the municipal hospital is docent or professor extraordinary in the university. Though distance forbids the formation of regular undergraduate classes, the rich material is not wasted, for groups of advanced students and physicians fairly live in the dead-houses of the new Berlin hospitals. At Friedrichshain and the Virchow'sche Krankenhaus (Berlin), routine and research are equally safeguarded: an intelligent municipality places pathologists of distinction in control,—in both cases the present incumbents are titulary university professors and docents,—and gives them every facility for observational and experimental study, including animal-houses, thus making the pathological laboratory of a city hospital a scientific establishment in which teaching and research are systematically prosecuted. Von Hanseman's laboratory at the Virchow'sche Krankenhaus and Pick's at Friedrichshain have three divisions, anatomical, chemical, and bacteriological, each with a permanent head busy in investigation, assisted by capable volunteers. Something like 1500 autopsies are annually made at each.[3] On the day of my visit at the Virchow, nine were made, five going on simultaneously; by way of service there are four corpse-servitors, one "preparator," one helper each in the anatomical and chemical divisions, two in the bacteriological, and five for other purposes. A superb collection of 3000 specimens exists there.

Nothing but time and energy limit the amount of work that a student may get

[1] At St. Mary's, London, Sir Almroth Wright enjoys the same advantage.

[2] This important topic is discussed in the following articles:
J. Orth: *Arbeitenaus dem Pathologischen Institut zu Berlin*, p. 33 (Berlin, 1906).
A. Bickel: *Ueber die Entwickelung der path. Physiologie* (containing bibliography) (Stuttgart, 1904).
R. Paltauf: "Die allgemeine und experimentelle Path.," *Wiener Klin. Wochen.*, 1900, No. 51.
R. Paltauf: "Ausprache bei Eröffnung des Instituts für allg. und exper. Path.," *Wiener Klinische Wochenschrift*, 1908, No. 44.

[3] About 6000 post-mortems are made annually in the pathological institutes of the municipal hospitals and the Charité, Berlin.

in general and special pathology. In order, however, to understand accurately the situation of the undergraduate, a subsequent chapter dealing with the curriculum must be to a slight extent anticipated. In discussing anatomy, physiology, and pharmacology, I spoke of required courses: the student is not admitted to examination unless he furnishes properly authenticated evidence that he has absolved them. No such stipulation applies to pathology: the student is examined in the subject on application. He is required to furnish no written evidence of attendance on any particular course of lectures, demonstrations, or practical exercises. He may prepare for his examination at his own peril as he pleases. Instruction is nevertheless offered on the supposition that the student needs, and will usually avail himself of, systematic training by way of acquiring the requisite basis. Doubtless most do, though some at least take large risks, relying more or less on the energy of an expert drill-master invoked prior to examination, or on a brief experience as *famulus*,[1] or undergraduate volunteer.

Instruction opens with a course of lectures in general and special pathology, occupying as a rule two semesters: the former dealing with the concept of disease and its ultimate material basis in the cells, fluids, and tissues of the body; the latter with the changes that take place in the different organs, in consequence of specific processes. Clinical reference crops up continually. "I never lose sight of the fact that I am training doctors, not pathological anatomists," writes Orth.[2] Here, as everywhere else, the oral presentation is abundantly illustrated. In the larger universities the projectoscope is used with microscopic slides as the lecture proceeds; fresh and preserved gross specimens are in some places passed around the class, in others are demonstrated to groups of students by assistants and volunteers at the close of the hour. Orth, an excellent and vigorous teacher, regards the latter method as preferable.[3] He urges with force that, in a large class, before the specimen has traveled far, the lecturer has taken up another point: those who receive it thereafter can never be sure as to just what point it was designed to illustrate. Moreover, those who listen carefully cannot pause long enough to observe well; vice versa, those who study the specimens lose the lecture. The demonstration following the lecture is pointed and controlled, —benefited rather than otherwise by the fact that only those stay who care.

No difficulty whatever arises in smaller institutions. Though the lantern is employed for enlargement of histological sections, the microscope is likewise used, and the lecture may be interrupted long enough to permit each member of half a dozen small groups to verify what has been thrown on the screen. Gross specimens can be sent around the class without danger of being excessively belated.

A histological course is also offered, usually in the summer semester: the extent of participation by the student himself varies. But in any case, he prepares some fresh

[1] See below, page 103. [2] Orth: *Die Stellung der path. Anat.*, p. 28 (Berlin, 1904).

[3] Orth has described his method in great detail in the pamphlet just mentioned above, and in "Die Entwickelung des Unterrichts in der path. Anat. und allgem. Path. an der Berliner Universität," *Berliner Klinische Wochenschrift*, October 10, 1910.

material, the supply of which never fails, and uses the simpler staining methods. Not infrequently, the clinical significance of the phenomena observed is dwelt on.

The instruction thus far described aims at a definite goal. The German pathologist looks toward the autopsy from the first. Teaching of pathology that did not expect to be thus rounded out would be regarded as almost absurd. General and special pathology and histology constitute, then, only the necessary basis for the post-mortem. An autopsy demonstration course in which the professor systematically demonstrates organs and regions in succession exhibits methods and explains principles. It is followed by autopsy courses, conducted by professor and assistants with small groups, in which courses the student himself does the autopsy, writes the protocol, and works up the material. Even so, the instruction has not reached its logical terminus; that comes only in the clinical years, when a case clinically demonstrated by the professor in the wards having terminated fatally, the next lecture hour belonging to the clinician is occupied by the pathologist, who conducts the post-mortem in the presence of professor and class: as wholesome a confrontation for the clinician as for his students.

We shall have occasion hereafter to inquire how generally students profit by thorough and timely use of the ample opportunity thus offered for grounding in the science of pathology, widely interpreted. Meanwhile, of the opportunity itself there can be no question. At Berlin and Munich, every member of an autopsy course may himself perform at least two complete autopsies in the semester; at Strassburg, daily autopsies gather material for the fresh demonstration course held thrice weekly and remarkable for its wealth and variety of content; striking and highly stimulating, too, is the frequent astonishment of these widely traveled pathologists at the novelties they themselves encounter as they demonstrate or expound. The museum is needed only for comparison and additional illustration: fresh material forms the basis of the training. The new incumbent at Würzburg goes so far as to discard the usual order of lecture topics; after a brief introduction, he teaches general and special pathology in such order as his fresh material determines. The fresh material at the moment available, not the order followed in a treatise, makes his text. This is in line with the practice followed in the clinic, where no effort is made to present disease in a fixed order of topics. The student is already familiar with normal anatomy and physiology: he ought to be indifferent as to the succession in which abnormalities are presented. The method is therefore pedagogically sound. The post-mortem groups are usually small, — twelve at Vienna, where four bodies are autopsied at each of three weekly meetings. Naturally enough, the small university towns are less fortunately placed. But the number of students is correspondingly reduced, and easy emigration enables the student at some time in his career to enjoy in Berlin what may have been relatively scant at Erlangen. The difference is, at the worst, one of degree, not of kind; quantitative, not qualitative.

In the matter of the clinical autopsy, the smaller universities show the greater conscientiousness. It is the essence of the clinical autopsy that, a patient used for teaching having died, the entire student body with teacher and assistants should repair to the autopsy room, where the professor of pathological anatomy or his prosector performs a post-mortem and discusses the findings. At Berlin, one is told that the clinical chiefs, hard pressed for time by the combination of university work and consultative practice, rarely witness autopsies with their students. Correlation is far better in some other institutions, as, for example, at Breslau, where Minkowski adjourns his clinical lecture to the dead-house, and with the students to whom he has exhibited the case regularly witnesses the autopsy on it; at Leipzig, the clinicians are, once more, irregular; the "good old custom,"[1] as Marchand calls it, is somewhat in abeyance; at Vienna, strong tradition requires the attendance of the clinician or his first assistant at the autopsy of cases not used in teaching; and of the teacher himself and his class when the pathologist occupies the usual clinical hour with a clinical autopsy. Whether or not the ordinary student always gets the minimum with which we have thus far dealt, there is no question but that in pathology, as in other subjects, the zealous student can get as much more as time and inclination allow. In the first place, there are research opportunities everywhere; next, additional courses, more commonly at large universities,—dealing with special topics: chemical pathology, experimental pathology, pathological anatomy of the sexual organs, neuro-pathology, pathological-anatomical diagnostic, diagnostic course with fresh material, are a fair sample of what Berlin offers in a single semester; experimental pathology of circulation and respiration, pathological anatomy of infectious diseases, are offered at Vienna. Even more characteristic, however, are the opportunities of the student as *famulus*, of the graduate as volunteer, to make themselves part of the laboratory routine. For periods varying from six weeks to three months or more, sometimes during the semester, more often in vacation, the student attaches himself to the laboratory of his choice, in or outside the university. He becomes an under assistant, with unrestricted opportunity, once the professor or division chief has finished, to utilize any material that he selects. The graduate volunteer is at times hardly distinguishable from an assistant except by absence of salary: he helps with teaching and demonstration, and takes his place among the paid assistants during the professor's lecture. It is impossible to exaggerate the importance of these practices, whose vogue so fully justifies Ostwald's characterization of the unusual man whom the German system wisely aims to save from an enforced mediocrity. In each of the more active divisions of the Berlin laboratory, from one to four volunteers may always be found; in the pathological institute of the great hospital at Vienna, there are usually, all told, some twenty-five, pledged to remain an entire semester at least. They take part in histological and bacteriological investigations, occasionally do a post-mortem, and, besides, are busied with a research theme, sanctioned, if not assigned, by the director. Rare, indeed, is the laboratory in which no students are to be found as *famuli*.[2]

[1] "Die gute alte Sitte."

[2] The *famulus* is admitted just as freely to all other laboratories,—those of gross anatomy, histology, etc.

Von Hanseman had one hundred and thirty-seven during nine years' incumbency at Friedrichshain; Pick, who now holds the post, has always four or five, taken for not less than three months' service; during the long holidays, Greifswald has invariably four to six practising the finer histological and anatomical methods. The Marburg "Chronik" for 1909 names three. Noticeable everywhere is the absence of formality and fussiness. This people, supposedly addicted to red-tape, keep their laboratory doors wide open; the laboratory is meant for work: let its opportunity and material not go to waste.

It will have been noticed that experimental pathology and physiological pathology play no part in the regular training of the undergraduate student. Their importance is theoretically conceded; but no effort has yet been made to organize them as parts of the usual curriculum. Now it is—or ought to be—a fundamental principle of science teaching that observation is enormously and legitimately assisted by reference to a problem or a process. The student's powers of observation in pathological anatomy will be strengthened by being brought into contact with the functional disorder in reference to which alone pathological morphology has for him actual significance. He will take a new interest in structural changes, if he has followed their development or watched their effects on the general condition of an animal.

The backwardness of the Germans in introducing physiological pathology into the curriculum of the average student is due to considerations previously mentioned. Virchow's successors as a rule lacked his scope. They found themselves fully occupied in the autopsy room. Appropriations were insufficient to employ a staff or equip a department for experimental work. Meanwhile, the work itself was not neglected; in recent years it has thriven everywhere except in pathological-anatomical institutes. As for teaching, there is nowadays little disposition to increase the complexities of the educational situation by adding new subjects to a curriculum already fairly unmanageable. Such instruction as is offered—in Berlin and Vienna, for example, whether in a special division of the pathological-anatomical laboratory or in a special institute of experimental pathology or serology—is of an advanced and research character altogether. Unquestionably, it need not be so. Undergraduate courses in experimental pathology have elsewhere proved feasible. But before they can be introduced in Germany, the facilities, appropriations, and staffs of the schools must be bettered, and a somewhat higher degree of correlation must be established between the several institutes and clinics.

Hygiene

The most recent in origin of the institutes invariably found in the medical faculties of Germany is that devoted to hygiene. The movement which in our own time has culminated in this department began in England as an outcome of the problems arising from the rapid growth of cities and the spread of the factory system. Ventilation, water-supply, nutrition, clothing, and contagion remained, however, topics amenable to merely empirical handling by teachers of medicine, physiology, or pathology, until Von Pettenkofer, docent in dietetic chemistry at Munich, enunciated in

1853 his conception of hygiene as an inductive and experimental science whose subject-matter is the influence of natural or artificially modified environment on the health of the individual. Successful studies of ventilation, soil, and water-supply procured for Von Pettenkofer a full professorship in 1865, and the first of hygienic laboratories in 1878. His failure, however, to reach rock-bottom in the matter of plague left the soundness of his conception somewhat in doubt. Except at Leipzig, his institute provoked no imitation until new vistas were opened by the brilliant rapid-fire discoveries of Koch and his pupils in the early eighties. In bacteriology, hygiene, already preoccupied with contagious disease, found precisely what it needed to justify its separate existence. Bacteriology transformed hygiene from an empirical art into an experimental science. Within twenty years thereafter, every university in Germany had obtained its hygienic institute. Its function is at once educational, scientific, and practical. There students are taught, health officers trained, theoretic problems investigated, preventive and curative sera produced, vaccination practised, examinations made, and the sanitary difficulties of the community solved. Meanwhile, independent institutes, serving in some respects the same ultimate purposes, have also been established; witness the Imperial Health Office at Berlin and Gross Lichterfelde, the Institute for Infectious Diseases, founded as a working-place for Koch at Berlin, the Royal Institute for Experimental Therapy at Frankfort; at each of which practical activity and scientific research are in simultaneous and mutually helpful progress.[1] In addition, bacteriological divisions are found occasionally in laboratories of pathology and almost universally in those of the medical clinic. Bacteriology furnishes thus another illustration of the complicated nature of scientific relationships at a high level. There is no one way, as there is no one place, in which it must be prosecuted. It is equally at home in hygiene and in medicine. Its possibilities will not be exhausted in either: hence, endless diversity of organization is possible; uniformity is not a thing to be artificially aimed at; completeness is unattainable.

The central feature of the hygienic institute is its bacteriological equipment: lecture halls, course rooms, research rooms, and animal quarters are provided. Every possible provision is made for the culture, isolation, and microscopic and experimental study of bacteria. Subdivisions are found in the more extensive institutes for the chemical, physical, and climatological aspects of hygienic investigation.[2]

The required instruction is limited to demonstrative lectures. A practical course in bacteriology, in which the student observes the important organisms, is everywhere offered; how large a proportion of students take it cannot be positively stated,—perhaps 50 per cent or more; but the arrangements for thorough individual work are not usually adequate. At Vienna, three practical elementary courses are annually offered in bacteriology: their combined attendance is less than one hundred,—something like

[1] See *Medizinische Anstalten auf dem Gebiete der Volksgesundheitspflege in Preussen* (Jena, 1907).

[2] For a detailed description of such an institute with illustrations, see R. Pfeiffer, "Das hygienische Institut der Universität Königsberg i. Pr.," *Klinisches Jahrbuch*, 1903, p. 639.

one-fifth of an entering class. The only practical exercise everywhere required is that in the art of vaccination: the student must take charge of at least two cases. The pedagogical principle involved need hardly be restated. Bacteriology is included in the medical curriculum because without it infection, immunity, and certain novel therapeutic measures cannot be intelligently grasped; a descriptive or illustrative presentation of the subject is only a little better than the didactic lectures characteristic of the pre-scientific era. Strictly scientific pedagogy requires that the student, starting with micro-organisms obtained from the clinic, cultivate the pure bacteria, reproduce in animals the characteristic lesions, and thence procure once more the pure culture; he can work out simple but fundamental problems in immunity and asepsis at the same time. A practical course of this nature would involve no insuperable difficulty if attempted with students who had entered the medical school with some positive training in biology. Here, as in dealing with physiology and pharmacology, we stumble on the defects due to a predominantly linguistic secondary education. Let me repeat that it is not necessary that every student be required to take intensive practical courses in every subject. "To know and do one thing properly," said Goethe, "is more truly educative than halfway performance in a hundred branches." Training, point of view, proper kind of interest and attitude, may be better derived from prolonged work in one or two subjects than from superficial work in half a dozen. The German arrangements lend themselves readily to this view. As practical courses — elementary and advanced — are offered in all subjects, students could easily divide up among them, so that every individual would be thoroughly trained in at least one of the fundamental subjects in addition to anatomy. That any such outcome actually results is highly unlikely. The material from which the facts could be ascertained lies in the archives of the Examination Commissions of the several universities, but it has never been critically studied. What happens is probably this: extremely zealous students enter practical courses not only in one subject, but in several subjects; less enthusiastic students — a very numerous body — do as little as they safely may. Meanwhile, the opportunities open in hygiene as elsewhere to a *famulus*, an advanced worker, or a practising physician, are practically unlimited. In addition to the regular undergraduate courses, Berlin offers work in military sanitation, occupational hygiene, public health, school and social hygiene, etc.; Marburg, in animal parasites; Graz, in the sanitary and economic aspects of the use of alcohol, sexual hygiene, etc. Everywhere research is promoted on any topic approved by the director. As evidence of the practical usefulness of these laboratories, it may be mentioned that in 1909, 2750 examinations were carried out in the institute at Marburg, 731 at Greifswald, 2196 at Breslau, 5889 at Göttingen, the last mentioned divided as follows: tuberculosis, 1614; diphtheria, 1743; typhoid fever, 2081; scattered, 451. The student who serves as *famulus* is privileged to assist in this work to the extent of his competency.

The more recent developments in immunity, serology, etc., occupy no uniform academic position in Germany. The problems involved are obviously accessible from bacteriology, pharmacology, or experimental therapy. The elasticity of the university organization is favorable to their study in all or any of several laboratories,—wherever, indeed, a capable individual finds an appropriate leverage. Intersection, wholesome in the underlying sciences, has at this stage become constant and puzzling; strict differentiation would be artificial and depressing. In Berlin, immunity and experimental therapy are presented as a subdivision of pharmacology; immunity and experimental chemo-therapy of infectious diseases as a subdivision of pathology; and similar courses are given in their laboratories by the university docents holding positions in the Koch Institute. At Marburg, experimental therapy is yoked with hygiene, an independent division having been there created for Von Behring; at Vienna, bacteriology, serology, and experimental pathology and hygiene occupy a new building, in which they are all on an intimate footing, despite their administrative independence of one another. The instruction offered in these laboratories is of an advanced character. Even where so-called "beginners' courses" are offered, the participants are usually physicians of some years' standing returning to the university to get in touch with recent ideas. Meanwhile, the instructors are themselves invariably productive workers, characterized as a class by their immense devotion and the wretchedly inadequate pay that seems in no wise to abate their zeal.

Legal Medicine

It remains to mention only the Institute for Legal Medicine, which, having attained independence and a full professorship in Austria, seems not unlikely to achieve the dignity of a separate establishment in Germany, too. The theory on which the institute for legal medicine is based may be formulated in a sentence. A doctor is one thing; a medico-legal expert something more. To avoid scandal, the courts require reliable sources of accurate and disinterested scientific counsel. They get it at Vienna, Prag, Graz, and Innsbruck by constituting the university professor of legal medicine their official adviser in all matters requiring the services of a medical expert. The chair was established at Vienna a century ago. It is a full professorship, of equal dignity with chemistry or anatomy. In his institute the professor performs all autopsies required for judicial processes,—300 to 400 yearly; thither are also brought all coroner's cases, sudden deaths which no physician's certificate covers, administrative cases, as, for example, death due to suspected cholera, still-born infants from the gynecological clinic,—these various sources contributing fully 1000 autopsies more annually; and here, too, blood-spots, stomach contents, hair, clothing, etc., are subjected to analysis as clues for the unraveling of criminal mysteries. For the carrying out of all such examinations the institute is equipped with post-mortem room, photographic outfit, chemical and physical apparatus, and a highly fascinating museum. In criminal trials, two experts, and no more, invariably appear: one is, as already mentioned, the university professor; the other, an outsider, a trained expert, also, designated by the court.

The development in the German Empire is less complete. The subject was long taught quite incidentally; it is still represented only by an associate professorship.[1] Institutes are found at Berlin dating back to 1886; in Leipzig, established in 1905.[2] Königsberg, Breslau, Kiel, and Munich have procured facilities only within the last year or two. Elsewhere they are still, as a rule, non-existent. The staff at Berlin consists of the professor and two assistants; in other universities, of the professor and one assistant; at Heidelberg, both posts were vacant in 1910. The intimate relation between courts and university that has been pointed out in Austria has not as yet been generally or securely established in Germany. In 1901, the instructors at five Prussian universities, including Berlin, were made ex-officio medico-legal experts; at Marburg, Greifswald, and Göttingen, by reversing the process, the district physician was designated associate professor in charge of legal medicine at the university.[3] But the lines are less tightly and clearly drawn than in Austria; in consequence of which, material is not regularly diverted to the medico-legal institute. The need of the anatomist makes him a hungry competitor for bodies, while chemical and other investigations are apt to be sent to the appropriate specialist.

Instruction in legal medicine[4] is by means of a demonstrative lecture course, nominally required in both Germany and Austria. But as the German student is not examined in the subject, he pays his fees and usually remains away. Students of law are more assiduous in attendance than those of medicine: even so, on the day of my visit to the lecture room at Berlin, there were hardly twenty-five present. Photographs and museum specimens, wherever they exist, are employed for illustration. As yet the supply is necessarily meagre in most places. In Munich, a collection has just been started; at Würzburg, a beginning has not yet been made. Progress will be slow in Germany under the present statutes. In Austria, criminal autopsies are performed in the presence of the class; not so in Prussia, where they must be privately carried out. If an autopsy is made under these conditions, it does not profit the students; if a criminal autopsy is not required, the hard-pressed anatomist lies in wait for the body. The study, therefore, cannot be said to be seriously pursued by German students; on the other hand, courses conducted for medical officers, who attend under orders or for the purpose of qualifying for governmental posts, are seriously regarded.

Conclusion

Now that I have completed a detailed account of the German laboratories, let me briefly sum up. Aside from the question of curriculum, the strength of the German

[1] An *extraordinarius.*

[2] The extraordinary professorship at Leipzig was created in 1897.

[3] See "Die Entwickelung der gerichtlichen Medizin," etc. Strassman, in *Das Preussische Medizinal- u. Gesundheitswesen* (Berlin, 1908).

[4] For details, see Strassman, as above; also Fraenckel, "Die praktische Unterrichts-Anstalt für Staatsarzneikunde," *Berliner Akademische Wochenschrift,* 1907, No. 11.

situation lies in the integrity of the separate laboratories, their internal completeness, their uniformity of type, their proximity to each other and to the clinics; the organization which relieves professor and assistants of menial drudgery; and the large scope opened to ability by means of advanced courses and research work for graduates, by means of *famulieren* and optional courses for undergraduates. Every one of these points would bear further emphasis if space permitted. Geographical compactness makes the entire medical department, externally viewed, a unified plant. It is not regarded as important that the medical institutes should adjoin the rest of the university. They are rarely situated on the same plot with the libraries and seminary rooms belonging to philosophy, law, and theology. At Vienna, Berlin, Breslau, Marburg, and Strassburg,—to mention no others,—a student of medicine need not see the other academic buildings. But lack of local contiguity does not shatter the ideal unity of the university. The four faculties are animated by the same purpose, too firmly held to be endangered by a certain amount of local separateness. Meanwhile, the constituent parts of each faculty are kept as compact as possible. The institutes and the clinics that form the medical department are therefore treated as a unit. The student loses no time in going from one laboratory to another, or from the institutes to the clinics; their proximity suggests their interdependence.[1] Scientist and clinician not only occupy the same university status, but they are in easy and natural communication. The same ideals inspire them; different aspects of the same problems engage them. Yet, though stimulating and assisting one another, every institute leads its own independent life. A worker has at hand what equipment he is sure to need. He does not borrow, he does not interfere by using rooms or implements belonging to others. Würzburg is typical; the institutes of physiology, pharmacology, anatomy, and pathology adjoin one another, the last two communicating. Yet physiology and pharmacology have each its own shop in charge of its own skilled mechanic, while physiology, anatomy, and pathology have each its own photographic outfit.

These conditions are highly favorable to the development of the several sciences. Research is favored by independence and privacy, by narrowing down of one's problem, even though from time to time the investigator is compelled to reach over into other domains for means and methods. From this point of view the German arrangement is ideal: the worker has his privacy as long as he wants it; help is next door whenever it profits him to seek it. Teaching, however, requires interrelation, cross-reference, "team-work." Now it is clear that in dealing with so intricate and extensive a subject-matter as medicine, any attempt to devise too highly organized a system of cross-relationships would give to instruction a conventional, cut-and-dried aspect that would be in the last degree unfortunate. A certain amount of looseness, unevenness, variety, leaving some interrelations to be worked out by the student, even at the risk of being missed by him, is more wholesome for both teacher and taught.

It is questionable whether the several German laboratories sufficiently take ac-

[1] Some of the buildings recently erected at Berlin depart from this sound principle.

count of one another as they proceed in their teaching. In my judgment, this defect is not solely or mainly due to the emphasis placed upon research, and is remediable without interference with the conditions in which research has flourished. The various parts of the medical curriculum pursued by the German student fail to play upon one another because the course of study is almost chaotic: the instructor has no way of knowing precisely what previous training his students have had; and not knowing what other branches they may have pursued, he simplifies the situation by presuming upon the least possible.

An equally serious defect is unquestionably the priority and the predominance of the lecture, by which sound pedagogical relationship is practically inverted. Science is method, — a method of doing; it is primarily practical, rather than speculative or theoretical. Training that expects to instigate action must rely on action; it must stress experience, not forestall experience. Merely communicated knowledge is pale, tenuous, flat, lacking in color, stereoscopic quality, and stimulative effect. This sound and obvious psychological principle, the lecture, which is the backbone and substance of the required teaching, largely ignores. On the other hand, I do not mean to imply that the student can be trained by direct and concrete methods alone; for this, the field to be covered is much too extensive. Fortunately, a somewhat limited actual experience will, if genuine and intelligent, invigorate and actualize a vast mass of vicarious experience. Soundly trained at bottom, a man may read far and listen freely without losing his sense of reality. The Germans apply this principle in dealing with research; but they have thus far failed to realize that it holds equally in respect to elementary training. Yet training in a practical sense is equally with research the business of the university, — the training of physicians, among others. Even where the practical course is provided, as in anatomy and physiology, the pedagogical arrangement is not thoroughly sound: in the former, a needless amount of lecturing survives; in the latter, lecture and practical exercise are not organically related.

The peculiar contribution of the scientific institute of Germany to pedagogical theory is in its combination of teaching with research. Therein the gymnasium and the university are distinguished from each other. In the former, the youth is subjected to a formative discipline; in the latter, his disciplined powers are applied to the mastering and improvement of progressive sciences. The gymnasial teacher is a schoolmaster; independent scientific and philosophical activity, however common, is not indispensable to the conscientious discharge of his primary duty. Production is incidental, not essential, to effectiveness as a secondary school teacher.

The university professor regards teaching and investigation as necessarily and indispensably involved in each other. The university student of medicine or philology is mastering not a given content, but a progressively advancing science or art. The Germans hold, and with justice, that only in a generally productive environment can the right mental attitude be inculcated. It is of course true that the exigencies of teaching limit the problems which an institute may take up. Heavy demands on the time and strength of a university faculty are made by administration, by examinations, as well as by actual instruction. Not even universities can be carried on without drudgery,—important as it is to keep routine within bounds. That granted, most university teachers are wisely and nobly used, even though teaching restricts their work in research. They are not mostly men of original genius. While still actively engaged in increasing knowledge, what better can they do than to train the oncoming generation for more effective social service, and to sift out the rare individuals who are so fertile, so fundamental, so intense, that they deserve to be segregated? In order that precisely these latter may be most favorably situated for uninterrupted devotion to fundamental problems, the foundation of research institutes has been suggested. A few have already been established; more are in prospect. There is no question that the intricacy and importance of fundamental scientific investigation suggest just such concentration of effort and of resources as the research institute offers. Whether these institutions should be entirely separate, or, as Kraepelin has urged,[1] be affiliated with the universities, it is not easy to say. Certain limitations as respects feasible appointments, organization, responsibility, have hitherto tended to attach to all university institutes; from these limitations, the research institutes ought undoubtedly to be free. Will simplicity, elasticity, and singleness of aim be promoted by independence or affiliation? The answer to that question must decide the point at issue. Meanwhile, however it be answered, there could be no greater error than to suppose that the university is likely to be thus deprived of one of the two functions which it has hitherto discharged, or that its importance in investigation is likely even to be diminished. Vitality of advanced teaching requires the proximity of investigation; and the fields open to investigation are too rich and too extensive to be completely occupied by institutions of a single type. Occasional geniuses of peculiar intensity may be set aside in research establishments solely for productive work; the more common but not less useful type of scientist may find uninterrupted application to either teaching or research insupportable. A modicum of routine in the shape of teaching may then assist research, just as research will help to illuminate one's teaching. The same holds also of industrial or other practical activities. Factories, health offices, and other establishments of similar character have their own routine; but routine itself is most intelligent if those ultimately responsible for its direction promote fundamental study of the problems which it involves or suggests. There are better ways to do what is being done; there are better things to do. Hence a really effective organization will never limit itself to routine. The marvelous progress of German industry, German sanitation, German hospitals, is due in no small measure to the fact that industry, sanitation, and medical care have, like university teaching, cultivated research in all relevant directions. Institutes for pure research will, then, to some extent be established and liberally sustained. But research will still continue to animate university laboratories, municipal hospitals, industrial establishments, and sanitary institutes.

[1] In *Süddeutsche Monatsschrift*, May, 1911.

The very fact that the conditions required by investigation cannot be simply and rigidly formulated makes it possible and necessary to work creatively under an immense variety of circumstances. From this, research benefits: for it thus gets the advantage of all the suggestions made by practical experience, all the questions propounded by practical difficulties, whether in the class-room, the factory, or public life. That any single source of helpfulness or suggestiveness — the university, above all — should be even partially closed may well be deemed preposterous.

That vigorous teaching and unwearying research have flourished together in the German university must in the end be largely ascribed to the elasticity characteristic of the organization. No obstacle obstructs the search of a mature student for a stimulating and congenial teacher; and a teacher with ideas can always gain a hearing for them. It is true that men whose productivity has ceased occupy important chairs in some universities; but in the same institutions, docents with more modern views expound the newer faith, which has perhaps already invaded a professorship somewhere else. While organized faculties tend to relapse into conservatism by favoring their own contemporaries, the pressure of the student body, the legitimate competition of universities with each other on a scientific plane, force the filling of vacant posts with men who represent progressive tendencies. Around such individuals, students of quick susceptibility soon gather; a school forms. The speed with which thereupon a novel standpoint travels over Germany is one of the amazing features of its university life. And this quick apprehension and incorporation of demonstrated truth is responsible for what I have repeatedly pointed out, — the uniformity of the scientific institutes in respect to type, organization, and ideal.

CHAPTER VI

THE MEDICAL SCIENCES: GREAT BRITAIN AND FRANCE[1]

Anatomy

The medical sciences are cultivated in Germany for their own sake. While this standpoint leaves some unsolved problems in connection with medical education, it has resulted in the splendid scientific development described in the preceding chapter. Whatever defects exist, they are not at any rate defects of material; for every element needed for the arrangement of a sound and properly motived medical curriculum is to be found in the rich and vigorous institutes of the German university. With the single exception of British physiology, the medical sciences in Great Britain and France, on the other hand, have remained in an instrumental relation to medicine and surgery. They have never wholly succeeded in establishing the fact that they have reached their majority, that they have a right to their own independent careers. It is still feared that if they asserted their own intrinsic interest and possibilities of development, they would lose sight of their obligations to the other members of the medical family.

For this reason, homogeneity and uniformity at a high level stop abruptly when we leave German for English, Scotch, or French soil. Of the medical sciences, anatomy henceforth signifies for the most part dissecting; experimental pharmacology is all but unknown in medical schools; the pathological laboratory as a rule shrinks to a dead-house; physiology alone can be said to flourish in British medical schools as a whole,—not even that in the French schools.[2] Important contributions to progress in every one of these branches have indeed been made in all three countries, but in general they emanate from individuals, not from institutions; from individuals, too, who, even if teaching in medical schools, have, as the whist phrase runs, had to "play their own hands." Hence their occasional, even if brilliant character, and their failure to determine a line of scientific development. The specialist has been slow to develop. The medical sciences have been cultivated by young men awaiting practice; a brilliant scientific achievement has brought them patients, not pupils and further scientific opportunity. It happens in consequence that the fundamental sciences, as far as they go, have been worked up in the tissue of practical medicine and surgery, —a fortunate circumstance; but, also, that they are generally held to be worth while only in so far as they aid the physician directly and unmistakably to diagnose, cut, or

[1] It should perhaps be explained that Great Britain and France are combined here and elsewhere because educational conditions in the two countries are, in respect to medicine, more or less similar. In neither has the differentiation between medical education and the medical profession been strictly or completely carried out. Moreover, both countries possess on the clinical side the excellent bedside method of instruction. As I have dealt with England in considerable detail, those resemblances make it unnecessary to describe French conditions at the same length, though they are in themselves perhaps equally interesting.

[2] I visited the following places: London,—all schools,—Liverpool, Manchester, Sheffield, Edinburgh, Glasgow, Paris, Lyons, and Lille.

prescribe. I mean by this that they enjoy only instrumental significance. Poverty and dependence have resulted, but dependence has been more damaging than poverty. For though the absence of resources and facilities is indeed sharply felt, the location of controlling educational influence in the wrong place is much more unfortunate. The medical scientist, reluctantly recognized in Great Britain and France, is still misconceived. In both countries, the floor is held by the clinician of a generation just passing, who persists in regarding the laboratory man as an inferior.[1]

Nevertheless, progress has been made. Half a century ago, Oxford and Cambridge—still mediaeval—embodied the English conception of a university. To-day, the provincial universities exemplify not unworthily the modern conception of a higher institution of learning, and the ancient foundations have awakened to the importance of scientific method and research. Strangely enough, the priceless good fortune which in both England and France intimately associated medical training with easy access to the sick has been among the factors that have in both countries retarded the development of the underlying sciences. As the old proverb has it, "The good is ever wont to be an enemy to the best." The physiologists leading, the medical scientist is, however, now in a fair way to establish, in Great Britain at least, his independence of the clinician, even though he has not yet conquered his condescension.

British anatomy developed under the influence of the Edinburgh school, whose tradition was formed and consolidated by the long reign of the three Monros.[2] Their method and point of view may be easily characterized. In the first place, they were physicians and surgeons,[3] as well as anatomists. They had prosperous practices, huge classes,[4] and little anatomical material. To these conditions they adapted themselves. In their anatomical instruction, they employed the expository method, describing with rare eloquence, and exhibiting drawings and engravings by way of illustration. The elegant descriptive lecture was thus established as the original Edinburgh method. From this procedure John Bell revolted toward the close of the eighteenth century. "He saw"—so runs Struthers's account—"that it was not merely demonstration, but the practice of dissection which was wanted." In his own words: "'In Dr. Monro's class, unless there be a fortunate succession of bloody murders, not three subjects are dissected in the year. On the remains of a subject fished up from the bottom of a tub of spirits are demonstrated those delicate nerves which are to be avoided or divided in our operations; and these are demonstrated once at a distance of one hundred feet! Nerves and arteries which the surgeon has to dissect at the peril of his patient's

[1] Sciences are taught "by teachers who are rather looked down upon and who are not in close touch with the higher teaching of their subject." Principal Headlam of King's College, London: *Appendix to First Report of Royal Commission on University Education in London*, p. 104 (London, 1910).

[2] One hundred and twenty-six years: Alexander Monro, primus, thirty-eight years, succeeded by his son, Alexander Monro, secundus, fifty years, succeeded by his son, Alexander Monro, tertius, thirty-eight years.

[3] The professorship of surgery was apparently implied in the appointment to the chair of anatomy. On the petition of the second Monro, the fact was made explicit by a new commission in 1777.

[4] Struthers gives statistics, p. 29.

life.'"[1] It was still, of course, too early to look upon anatomy as anything but the handmaid of surgery; even so, forty years passed before what Bell called "the windy and wordy school" of Edinburgh explicitly adopted his position. As late as 1825, out of a class of 200, not above 30 engaged in dissecting.[2] Even when, a year later, a practical course of three months' duration was made compulsory of candidates for the diploma of the College of Surgeons, the lecture was neither supplanted nor curbed. It struck no one at the time, and it has struck few since, that the practical exercise and the descriptive lecture are non-compatibles. The practical exercise was simply annexed, and the union of lecture and dissection from the surgical standpoint became thenceforth the recognized method of the nineteenth century. "To have the science of anatomy and its application expounded by the anatomist in the lecture room is of unquestionable importance; but this must be accompanied by careful instruction of individuals in the practical rooms. It is the combination of the two which constitutes a good school of anatomy."[3] The lecturer tells the student what to look for; on the dissecting-table he finds it. The process of learning is a process of identification and retention. The science is a closed book. Even if the volume be occasionally opened for emendation, the adult body is after all what it is. The conventional anatomist is exceedingly expert in taking it to pieces, precisely as it has been taken to pieces before. He has a name for every distinguishable feature and a mark for every one of its distinguishable parts. His patience and vigor in explanation and inculcation are beyond all praise. Didactic description, dissection, drill, — these are English and Scotch anatomy; a conscientious, prolonged, painstaking, but uninspiring routine that usually accomplishes what it deliberately sets out to do. Its merits and its limitations are thus at once characterized.

The British or French anatomist requires little at best. Arrangements for preserving cadavers; clean, well-lighted, odorless dissecting-rooms; a lecture hall with a blackboard, freely and very helpfully utilized; a museum containing a varying number of charts and special and mounted dissections so labeled as to facilitate the identification of parts; an ample supply of bones, — all these the most fortunate anatomists have, and in most instances this is all they have. The Edinburgh department has now a projectoscope and a photographic outfit, — the latter a very rare detail. Occasionally, the lecture room contains a projectoscope, as at Glasgow, Liverpool, Manchester, St. Bartholomew's, and Guy's (London), and a small supply of embryological models. At most of the London hospital schools, and at University College, London, the departments are scantily equipped, on the simple lines just indicated. This statement applies also to the Extra-Mural School of Edinburgh, whose outfit consists mainly of blackboard, books, and bones. At Paris, the teaching equipment includes dissecting-rooms and lecture hall, the latter too small to accommodate the hearers; the student collection is of little value for its ostensible purpose. A large, well-lighted hall, supplied with dissecting-tables, at each of which five or six students work together, constitutes the

[1] Struthers, p. 38. [2] *Ibid.*, p. 64, note. [3] *Ibid.*, p. 94.

equipment, and suggests the character, of the instruction at Lyons. Microscopes and reflectoscopes must be rare indeed in the smaller provincial universities of France, if Lille may be taken as a fair example. Nevertheless, even the weakest schools avoid scandal. They are merely backward. Everywhere the student can learn and can dissect the parts of the human body. At one or two of the smaller English institutions, Oxford and Sheffield, for example, really charming apartments are devoted to the subject.

The break with this traditional method of presenting the subject comes with recognition of the genetic view. To understand the topography of the adult body, one must understand its genesis. Histology and embryology are thus introduced. Therewith anatomical research becomes one of the legitimate concerns of the anatomical department. The systematic lecture tends to fall into the background; dissecting becomes an exercise in inductive thinking as well as in manual dexterity. Ceasing to be an incidental occupation for a physician or surgeon, the subject requires the constant presence of a specialist devoted to teaching and investigation. Development along these lines is apparent at Glasgow, Manchester, and King's College, London, at all of which the departments are distinctly more than the dissecting and lecture rooms elsewhere devoted to the patient inculcation of facts. At Manchester, indeed,— and thus far there alone as yet, I believe, — the systematic lecture has been discarded. There the professor no longer describes the bones, blood vessels, muscles, and nerves; he employs the lecture to present comprehensively and organically what dissection takes apart,—the lymphatic system, for example. Even where the broad scientific conception of the subject has not established itself, modern conditions have been recognized to the extent of employing as heads of anatomical divisions men who no longer carry on medical and surgical practice. There is now little disposition either in France or Great Britain to question the wisdom of placing specialists in charge of the department: at the Scotch universities, most of the English universities, in most of the London schools, and in Paris, the modern order thus far prevails. These men being teachers may, like academic teachers in other branches, migrate freely from place to place. Curiously enough, in Great Britain the current flows from, not towards, London. The poverty and commercial aspect of medical education in the hospital schools render the posts there decidedly unattractive: a capable teacher, turning up in one of them, will shortly be called to the greater comfort, dignity, and remuneration of a provincial or Scotch university.

Exceptions to the full-time specialist can, however, yet be noted; the departmental head at Liverpool is consulting surgeon to the local Hospital for Diseases of the Throat and Chest; the head at St. Mary's (London) is chief surgeon to the out-patient department. Of a teaching staff of subordinates, relatively permanent in composition, devoted to the academic career and to scientific ideals, there is as yet little trace. Professor Elliot Smith has instituted one at Manchester; but elsewhere in England, the demonstrator of anatomy is still usually a young surgeon, teaching anatomy because the demands for his surgical services are not yet pressing. Of three demonstrators at the London Hospital school, two are simultaneously assistant surgeons; the senior demonstrator at Charing Cross (London) is an assistant surgeon; and one of the juniors, the orthopaedic surgeon; at St. Mary's (London), the senior demonstrator is assistant surgeon in the department of ear, nose, and throat. The head demonstrator at Guy's (London) is surgeon in charge of the genito-urinary work; another demonstrator is anaesthetist; one of the demonstrators at St. Bartholomew's (London) is assistant in out-patient surgery. Junior assistants, often in practical charge of the dissecting-rooms, are well-nigh invariably young surgeons. They pass through the anatomical purgatory on their way to the hospital staff ladder. The instrumental character of the subject—and in narrow reference to surgery, at that—could hardly be more unmistakably emphasized. Nor is its independent dignity enhanced when, as at St. Thomas's (London), the head of the department supplements his income by serving as Secretary of the Students' Club, as well as lecturer in the London School of Medicine for Women.

The activity of the departments still expends itself almost wholly in routine teaching, thus defeating one of the main purposes that the academic basis is designed to fulfil. For the whole-time teacher is not wanted only in order that he may drill successive classes during as many working hours as he can contrive to keep awake. Not only the student, but the subject, demands his devotion; by devotion to the subject in a creative, not sacrificial, sense, he must assist in maintaining conditions congenial to the existence of a spirit of inquiry. Between the full-time extra-mural drill-master at Edinburgh and the busy surgeon at London, there is small ground for preference, scientifically speaking. At his worst, however, the full-time teacher has one great advantage: he is not a stranger to his own dissecting-room. Under the surgeon anatomist there was—and where he survives still is—little or no commerce between the dissecting-room and the lecture hall. The effort to establish communications between them was actually resisted at Paris; nor has resistance been yet overcome, although Nicolas, the present incumbent, declined to accept a call thither from Nancy, unless control of the practical work went with the professorship. The surgeon assistants and prosectors resent a policy of departmental organization; and the students have taken advantage of the tension actually to rebel. They are so far from recognizing or even conceding the wisdom of importation on the basis of merit that, having come to Paris to study, they insist on being taught by a Parisian, not a provincial, anatomist. Disorder resulting from the inopportune and violent expression of this sentiment, whenever the professor entered the hall, has just led the government (December, 1911) to close the medical school to all students of the first and second years.

The ruthless expenditure of the teacher upon routine is, however, common. The French or British student wants to pass. What he does, and the way in which he does it, are carefully and narrowly calculated with this end in view. The schools know this and trade upon it. I have already pointed out that British medical schools, strictly speaking, have no entrance standards in medicine. The student selects the qualification he prefers and complies with the general educational requirement that it carries; all schools train simultaneously students seeking different qualifications. Essentially the same situation exists in the professional instruction offered by the medical school. The school conducts a variety of courses in each subject. Each course has a particular qualifying examination in view. No course offers much margin; it includes what is believed to insure a safe passage of the barrier,—no more, no less.[1] To the end that a student contemplating one qualification may be efficiently protected against doing the extra bit involved in another or higher qualification, special officers—so-called tutors—are appointed to shepherd the respective flocks. The Conjoint men form one group; the Oxford men, another; the Cambridge men, a third; the London University degree men, a fourth; the fellowship men, a fifth. Competition for students turns very largely on the efficiency of the tutorial work thus organized; and the time and energy of the full-time teacher and his part-time assistants are utterly consumed in an endless succession of drill classes. The prosperity of the school depends primarily on its percentage of successes, and, be it added in passing, on its athletic facilities; for, though forced to forego laboratories, apparatus, and teaching staff by reason of poverty, almost every London school supports an athletic field.

Let us examine the anatomical instruction at St. Bartholomew's, by way of example. Students expecting to qualify before the Conjoint Board hear four lectures weekly from October to March and two lectures weekly in the summer session. Special and different additional provisions have got to be made for each of the following groups: (1) the Intermediate M.B. Oxford men; (2) the Intermediate M.B. Cambridge men; (3) the Intermediate M.B. London University men; (4) those going in for the Primary Fellowship of the Royal College of Surgeons, etc. Now, the fellowship examinations recur twice annually, in November and May. It would never do for a student who goes up in May to do his work in October: the course must therefore be given twice. The Cambridge M.B. comes in December and June; two groups must then be formed with a view to its requirements, etc. These different examinations correspond to no genuine distinction in individual capacity, individual function, or scientific interest. The Conjoint men, the London degree men, the Oxford men, are, after all, only ordinary doctors. The different appellations have merely a social, professional, and business value, and the student strives for the one which satisfies his personal ambition. The schools assist him so to strive that the entire burden of effort, beyond mere absorption, is successfully shifted from him to the tutors and demonstrators who are sterilized in order that he may write one set of letters rather than another after his name.

[1] The objection to this is neatly put in the following verses:

"Willst du dein Brotfach recht verstehen
Musst auch in Nebenfächer sehen;
Wer nicht mehr lernte als er musst
Hat, was er musste, nie gewusst."

A heavy price, this, to pay for doubtful success in a futile cause. With the schools straining every fibre toward passing their students, the Conjoint Board rejected 42 per cent of its candidates in anatomy and physiology between 1905 and 1909.[1] But a higher percentage would still be an insufficient apology. Suppose the students did learn the facts that their tutors realize in advance they must know, and thereupon all come to a dead halt—students and teacher alike? Can a structure like clinical science be erected on so limited, inert, and inelastic a foundation? The point we have already discussed recurs: science is method, not information. The French and English students have been drilled in details, but they have failed to acquire scientific method. Their routine has entirely lacked stimulating quality; the best proof is that their schools make no allowance for unforced individual initiative in anatomy. The student may indeed make an additional effort, but its tangible reward must first be dangled before his eyes in advance. He will put in some extra blows for a diploma or a fellowship, but openings are not created for disinterested scientific zeal. There is forcing from without rather than impulse from within. There are no *famuli* in England; no optional courses to satisfy the mere love of work; and in most lines no institutional research.

The drill-master is a fairly universal institution: he can be found wherever there are students who shirk and examinations that threaten. As the "Einpauker" he exists in Germany; obviously, the abundance of lecture courses—to the contents of which certain tests are restricted—gives him there an opportunity that he is not likely to neglect. But after all, the German "crammer" operates shamefacedly. He is no part of the educational system. He knows in his heart that he defies its spirit and intent. In Great Britain, cramming is of the essence of the system itself. It is aided, abetted, and required by the schools,[2]—at Edinburgh, even by the university. For the extra-mural teacher of anatomy serves as drill-master to the university students: the Extra-Mural School has even asked a subvention from the government on the representation that it "teaches" the university students.[3] And how? There is a daily lecture on bones: every man gets a specimen; three weeks may be spent in hard teaching of the temporal bone; and the teacher does everything,—emphasis, repetition, quizzing, being his tools. The duller student sets the pace. In winter, three separate demonstrations are given daily; the men going up for examination take all three. How can they escape ignorant?—in the course of three months the entire body has been covered! In general, conditions are less satisfactory in France than in Great Britain. At Lille, equipment and facilities are inferior to even the poorer London hospital schools. The narrowly instrumental point of view is still further accentuated by the only too obvious subordination of all the underlying sciences to the clinic. For

1 Figures for the other subjects are given in chapter xi.

2 Cooke's School at London, and Anderson's College, Glasgow, like the Extra-Mural School at Edinburgh, make a business of cramming for examinations.

3 *Minutes of Evidence taken before the Committee on Scottish Universities*, p. 62 (London, 1910).

the French student puts in—or is supposed to put in—his mornings at the hospital; he dissects and attends lectures in the afternoon. During his first year, hospital attendance is optional; instead of devoting the flower of the day to anatomy, he is privileged to waste it. At Paris, dissecting is crudely done. One hundred students occupy each of eight halls; tables and a blackboard constitute the equipment, a single demonstrator with three assistants constitutes the staff. At Lyons, smaller numbers are perhaps more efficiently handled. But the absence of embryology and the treatment of histology as a separate entity, apart from both physiology and anatomy, confines the subject to narrow limits.

The supply of material in both countries is unsatisfactory. In Paris, it is steadily decreasing. There, unclaimed bodies are held for seventy-two hours before delivery to the anatomist. As the hospitals lack satisfactory cold chambers, the condition of the material leaves something to be desired. Material is more abundant at Lyons, where in the winter of 1911, 200 cadavers— most of them already autopsied—were furnished by the hospitals for a dissecting class somewhat less than 300 in number. In England, the unclaimed dead from hospitals and infirmaries constitute the anatomical supply. But what with the increase of sentimentalism and democracy and the institution of old-age pensions, conventional burial awaits many a corpse that would formerly have been dedicated to education. In consequence, from ten to twenty men take part in the dissection of each cadaver. In London, the struggles of the schools confuse the situation. Bodies are pooled and divided, but, it is charged, "some schools don't run straight,"—an incidental result of proprietary competition.

Physiology

British physiology contrasts strongly with British anatomy. It was in the first place earlier successful in procuring the academic environment which guarantees protection, continuity, and congenial company. I have already pointed out that the medical sciences in Great Britain have lived on the chance that brilliant men could devote to them a decade marked by youthful enthusiasm, prior to more or less complete immersion in practice; that almost inevitable absorption in practice, following scientific achievement, interrupted the development of science by making it impossible for a teacher to train his successors. Physiology proved a fortunate exception to this general rule. William Sharpey, appointed professor of anatomy and physiology at University College, London, in the thirties, was a pioneer in developing the latter subject in an independent fashion. He gave their start to Michael Foster and Burdon-Sanderson, whose studies took a modern turn under the influence of Ludwig and Claude Bernard. Full academic recognition and protection were procured for physiology in 1883, when Foster became professor at Cambridge, and Burdon-Sanderson professor at Oxford. The importance of academic status could not be more impressively established. Physiology thenceforth enlisted the total devotion of men interested in it for its own sake; it furnished a legitimate and satisfactory career, to which a succession of able men have been attracted. The subject has thus advanced with unbroken continuity, until it is now the most highly developed of all the medical sciences in England, with international recognition. Nor is this fact of importance merely from the standpoint of research; for physiology is likewise the most efficiently taught and most stimulating subject in the medical curriculum. The history of British physiology proves conclusively that what is best for a subject is best for all the varied purposes which, directly or indirectly, it subserves.

Up to the time when Foster began his career, physiology had been taught—as Foster himself says—by "men whose intellectual loins were girded for other purposes, and who used the posts as stepping-stones"[1] to other ends. The instruction had consisted of lectures, illustrated by occasional experiments, a simple course in histology, and perhaps a few chemical exercises. To Foster himself is largely due the initiation of the practical course in training undergraduates. He held that the "teacher must have the means of leading his students along the only path by which the science can be entered upon—that by which each learner repeats for himself the fundamental observations on which the science is based" in a laboratory where "each post for teaching is no less a post for learning." Huxley had previously successfully applied the same principles in arranging his courses for teachers, at South Kensington, where an introductory talk of an hour was followed by four hours' laboratory work, in which with naïve astonishment and delight those who had been teaching natural history from books now for the first time came to know the objects themselves.[2]

Despite its flourishing condition, special institutes of physiology are still rare in Great Britain, though they exist at University College (London), and at Glasgow, for example. In general, all the medical laboratories are housed together, under which circumstances physiology gets a suite of rooms varying in number and extent. By all odds the most modern establishment is the Institute at University College, London. It forms a rectangular edifice occupying a site of 44 feet by 144 feet. The ground floor is devoted to laboratories for research in physiological chemistry, consisting—if we follow them in order—of a balance room, the private quarters of the assistant professor in charge of the department, a general research laboratory, accommodating eight workers, a combustion room, a distillation room. The floor above is devoted to experimental physiology on one side of the staircase; on the other side to the lecturing theatre, seating two hundred students, and equipped with two lanterns. A departmental library of some four thousand volumes, the professor's private laboratory, a general research laboratory, and two rooms for the physical investigations occupy the rest of the story. The second floor is given to histology, neurology, and aseptic work. The students' class-room for histology and experimental physiology is 63 feet by 42 feet. It is filled with working-benches accommodating

1 "Address before British Association for the Advancement of Science," printed in *British Medical Journal*, 1897, vol. ii, pp. 445, 446.

2 *Life and Letters of T. H. Huxley*, by his son, vol. i, pp. 405-410 (New York, 1901).

seventy workers; each student is provided with locker and drawer, with water, gas, and electric light. Five long tables are equipped with shafting for experimental work. The floor includes further: a demonstration theatre, accommodating forty students, and equipped with kymograph, artificial respiration apparatus, time-marker, with water and electric power; a suite of rooms devoted to the physiology of the nervous system; and the aseptic department, consisting of sterilization room, operating-room, animal bath, and animal hospital. Close by are satisfactory quarters for animals. The Glasgow laboratory, though less well planned, is likewise a complete institute of modern character. At Manchester, the physiological rooms are quite extensive; a well-equipped and productive department occupies somewhat rambling quarters at King's College (London); at Edinburgh University, the provision is crowded and inadequate, though a highly active incumbent has succeeded in triumphing over limitations of space and inadequacies of equipment. The extra-mural department there is meagre in the extreme. Of the London hospital schools, Guy's and the London are perhaps most satisfactorily fitted out. At St. Bartholomew's, the subject commands only two large rooms, one for chemical work, one for experimental work, and a smaller room for the instructor. At most of the hospital schools, narrow resources leave little time or energy for scientific activity. In general, however, the facilities for routine practical work by each student on both chemical and experimental sides are everywhere good, — far exceeding anything to be found in the German Empire, Austria, or France.

In France, indeed, the subject is for the great mass of students only demonstratively and descriptively presented. At Paris, lectures to medical students are given in the large amphitheatre of the Faculté de Médecine in the École Pratique. The demonstrations are hampered by reason of the fact that the same amphitheatre is used by professors in different subjects. The general lectures are supplemented by smaller courses — likewise of demonstrative character — in which the classical experiments are exhibited. Little provision for practical experimental work by the student exists. The teaching of all the sciences has been severely criticized on this account. A recent critic urges with great force that science teaching is properly teaching by collaboration, not by affirmation. "It is necessary that master and student be associated in a common task. The student is not a mere pupil who listens or takes notes; he is an apprentice who is exercised in observation and experimentation in contact with a master."[1] On the other hand, there are some opportunities for research, as Richet's publications prove. Unfortunately, however, the research laboratory of the professor is situated not in the École Pratique, but in a separate building, several miles distant: so weak is the bond between medical teaching and research in France. The laboratory at the École has been turned over to the *agrégé*. At Lille, there are found a few sets of apparatus of recent make, but the general appearance of the department is decidedly forlorn.

In England, physiology is now invariably taught by specialists; the departmental staff, however, is not as yet satisfactorily developed. Assistants who expect to make

[1] "L'Ecole de Médecine Technique," by M. le Dr. Le Redde, *Tribune Médicale*, October 8, 1910.

their careers in the subject are indeed found in Liverpool, Glasgow, Edinburgh, and occasionally in London; but more frequently—largely on account of lack of funds—the junior assistants are young physicians, waiting for an opening in medicine or surgery. The same condition accounts, too, for the exhaustion of the specialist in routine work at more than one institution: the lecturer at St. Bartholomew's is, for example, simultaneously instructor in the same subject at the Bedford College for Women.

To the English belongs the credit of devising a sound method of undergraduate scientific instruction, just as we shall shortly perceive that they have applied the correct principle in clinical instruction. The national instinct must be fundamentally sound; for the head of Dotheboys Hall was already on the right track. "We go upon the practical mode of teaching," explained Mr. Squeers to Nicholas Nickleby. "C-l-e-a-n, clean, verb active, to make bright, to scour; W-i-n-d-e-r, winder, a casement. When the boy knows this out of book, he goes and does it."

The essential features of undergraduate instruction are these: the demonstrative lecture and the practical work run side by side. When Foster lectured on digestion, his practical course dealt with the chemistry of the process. Each student has an assigned desk with complete individual equipment; he sets up and carries out his own experiment. The examination requirements tend undoubtedly to overemphasize lecture and text-book work, but the instinct and preference of the better teachers refuse to be bound down. Obscurantist anti-vivisection legislation, however, constitutes a serious handicap; for on the operative side the laws endeavor to curtail such leeway as the examinations leave[1] by restricting the experimental work of the student to pithed frogs. Sherrington has, however, devised an operative course with mammals which, without infringing the law, involves the use of decapitated cats under artificial respiration.[2] He thus procures reactions more nearly resembling those of the human subject; and experiments can be worked out which bear more closely on medical problems. Undoubtedly the labor of conducting such courses is heavy. Nowhere, I believe, is the staff what it should be in point of size; but the vitality of the subject is evidenced by the enthusiasm of this instruction despite the handicaps, and the not uncommon concurrent productivity of the instructors.

It is important to note that the method just now characterized is never defeated by numbers. The English do not resort to mass or demonstrative teaching in physiology; by skilful adjustment they avoid the necessity. The Liverpool classes are of course small; but the method would not be abandoned were they much larger. At Guy's, a class of 60 is handled by two men; at Cambridge, 100 are managed by subdivision into three groups, each group spending one day a week at each of the three parts into

[1] See appendix to *Fourth Report of Royal Commission on Vivisection*, testimony of Professor Gotch, pp. 34-49, and that of Sir Victor Horsley, pp. 118-149.

[2] He described his method in *Journal of Physiology*, vol. xxxviii, p. 375, and *Quarterly Journal of Physiology*, vol. iii, p. 209.

which the course is divided—chemistry, histology, operative work; and in histology—at Cambridge as at Edinburgh—the student prepares his own slides; most significant of all, however, is Edinburgh, where 240 students attend the practical course at the University. Only lack of space and proper number of assistants restrict the physiological work to the nerves and muscles. I witnessed one of these exercises: nothing could have been more orderly or effective. Every student competently handled his own apparatus, made his tracing, pasted it in a book, and wrote up the requisite notes: he was "signed up" only if his results were satisfactory. The practicum lasts two hours; but the laboratory is open all day, and students are free to come and go as they please.

The skill with which the practical work is handled effectually disposes of the contention that it is feasible only with small classes. There remains the objection based on the quality of the student's work: a German would urge that the boy fumbles, blunders, wastes time, achieves a result inferior in finish to the professorial demonstration. The fact is in general indisputable, but it quite misses the pedagogical point. We are not primarily interested in the product. Market considerations do not decide the value of the practical exercise. We are concerned to establish within the student's intellectual habit the priority of observation over authority. He is, for example, required to draw, not that he may produce artistic illustrations, but that he may be forced and trained to see. The student's own blunders and bruises can alone finally set him on his feet; to save him from error, to keep him whole, means only ultimate helplessness. Fortunately, men are so constituted that a necessary lesson can be learned even while the actual exercise is far from expertly done; nay, more, even though the entire field be but fractionally covered. A student who has experimentally grasped the actual import of metabolism, respiration, secretion, circulation, can read far and freely without losing touch of reality.

In the long run, the entire complexion of one's thought may depend on whether one starts with description or experience. To begin with, description tends to reduce experience to mere illustration. In that case, the student starts with a notion, and the experiment only bears it out. A practical course of this sort confirms him in a kind of unquestioning passivity. Premature communication from an authoritative source may thus in advance destroy that virgin freshness of curiosity which is so powerful an incentive to inquiry and effort. Professor Paton, at Glasgow, has worked out a practical course for students on the opposite principle: "The problems to be investigated and the method of investigation are indicated, but *the results to be obtained, and the conclusions to be drawn, are left to the student*, who must before all be taught to observe and to experiment without preconceived ideas, and without any anticipation of a particular result, but with a mind open to accept whatever result may be obtained, and from that result to attempt the solution of the problem under investigation. The course should be taken along with a course of lectures and demonstrations, and it should be arranged that *in each part the practical work precedes the* *lectures.*"[1] Professor Paton does not deny that it is hard teaching: "The students feel hopeless at first; but let them fumble and come to grief. They soon take hold; thenceforth the practical exercise informs and vitalizes the lectures."[2] The concrete method is not everywhere so strenuous as this; nor, perhaps, need it be. Lectures and practice may run parallel with satisfactory results and not too great expenditure of time. On the other hand, practical instruction may be rendered as safe and simple as at Munich; as it is, in some ways, at Manchester, where physiology is concretely taught in a way that effectually avoids imposing any strain on either imagination or reasoning powers. Every conception is visualized not by, but for, the student: this bottle shows the actual volume of lime in the body; that, the actual amount of carbon breathed out in one hour. Printed slips distributed as the class meets give in concentrated form the contents of the forthcoming lesson. Thus may the practical defeat itself by denying to the student all responsibility and opportunity for the exercise of power. There is no error; but then there is no effort.

The minimum requirement in the subject comprises two lecture courses occupying a summer and a winter session, and practical courses of the same length, in the same sessions. The practical courses are devoted to physiological chemistry, experimental physiology, and histology.[3] The last-named is at times treated in a somewhat stepmotherly fashion, and would undoubtedly fare better if assigned to anatomy, which would, in its turn, be enriched by the transfer. Additional courses—lectures and practical—are supplied for candidates going up for the more difficult examinations.

With this word the obverse side of the picture comes into view. The instruction suffers from the limitations imposed by the low entrance requirements; for practical physiology can hardly be properly developed with students whose physics and chemistry are as meagre as we have found them to be. The cut-and-dried science teaching of the first year thus hampers the physiologist at every step. He is still further hampered by the tutorial treadmill. What I have said of the variety of examinations for which special preparation must be made in anatomy holds equally true in physiology; with increased bitterness resulting, for the physiologist has other ideals. There is, however, no escape: in London, at least, he could not make ends meet without the income derived from tutorial classes. He practically takes upon himself full responsibility for the fate of his pupils; the catalogues of the competing London schools vie with one another in describing their endeavors to make their patrons secure. "Special

[1] *A Practical Course of General Physiology for Medical Students*, by D. Noel Paton and G. H. Clark, preface (Glasgow, 1908).

[2] There are 600 students of medicine at Glasgow, so that the classes in physiology are not small.

[3] I have been told that the combination of histology with physiology follows an Edinburgh precedent, which originated in business, not scientific policy. The subject was first taught there by Bennett, professor of physiology, to whom it was assigned in order that the fees might supplement his small salary; the anatomist was already prosperous enough. In France, as I have already remarked, histology forms by itself a separate department,—a very undesirable arrangement. The instruction is altogether imitative—the student looks at slides already prepared and sees what he is told to observe. But the anatomical or physiological implications remain unilluminated.

classes and examinations are conducted throughout each session," reads the catalogue of the London Hospital School; "tutorial revision classes are held by the demonstrator every three months." The student going up for the first time may attend or not as he pleases; but "attendance is compulsory for those who have been referred."[1]

I alluded to the contrast between anatomy and physiology in medical schools. Anatomy, we found, had not yet modernized in Great Britain; it has never shaken loose from the domination of the original Edinburgh idea. To this day it remains only an instrument, necessary to medicine and surgery, with very occasional interest beyond. The instruction offered is practically unvarying from school to school: systematic anatomy for all comers, advanced anatomy nicely adjusted to the somewhat more difficult examinations, practical anatomy,—these, with a uniformity that could belong only to a dead science, recur everywhere. The provincial universities, Oxford, Cambridge, the London Hospital Schools, all are practically alike. Physiology, on the other hand, presents the variety belonging to a living science. The requisite minimum and the higher courses necessary to the more advanced examinations are given in every school. But the departments do not stop there; optional courses are everywhere offered. At Liverpool and Edinburgh, for instance, three or four students annually interrupt their progress along the beaten path to the medical examinations in order to earn a B.Sc. degree by advanced work or research in the laboratories of physiology or bio-chemistry; at Glasgow, the same degree is offered under similar conditions. The student can pursue advanced work in any one of five branches: (1) metabolism and digestion, (2) circulation and respiration, (3) muscle and nerve, (4) special senses, (5) physiological chemistry; and in the division that he elects he is required to work out a minor problem adapted to his powers. At Cambridge and Oxford, the "honor degree" attains the same end. This active spirit crops out also in the London Hospital Schools. At Guy's, for example, brief electives cover the physiology of the skin, the secretion by the kidney, the variations in the chief constituents of urine; St. Thomas's offers an optional in coagulation of the blood, muscle, and milk; London Hospital, one in the physiology of the senses. The research journals bear constant testimony to the activity of Starling's laboratory at University College, Halliburton's at King's, Hill's at London Hospital, Sherrington's at Liverpool, Schäfer's at Edinburgh,—to pick out only the best known. The conditions are not always favorable, for the routine load is heavy; but where ideals burn brightly, conditions do not have to be propitious: difficulties are surmounted somehow. This is perhaps the more remarkable because physiology in England foregoes the incentive that in Germany is furnished by the clinic. We have learned that German medicine has taken up the physiological point of view. The German clinician is a trained, often a productive, physiologist. English physiology has not yet conquered English medicine. With a few brilliant exceptions,— such as Sir Victor Horsley, for example,—the English surgeon and clinician have done little to apply physiological method and technique to clinical

[1] "Referred" = failed in examination before the qualifying body.

or surgical problems. In consequence, unlike Germany, the productive literature of physiology in recent times must in Great Britain be credited almost entirely to physiologists alone.

Pharmacology

In dealing with anatomy and physiology I have already intimated that the medical schools are not entirely representative. This is even more emphatically true of British pharmacology.[1] Excellent pharmacological studies have been made by physiologists as well as by clinicians: witness Langley's work with nicotine, Ringer's on the inorganic salts, Brunton's with the nitrites, Fraser's with strophanthin. Moreover, some firms of manufacturing pharmacists in England maintain excellent research laboratories of pharmacology. Our account is, however, concerned with pharmacology as an integrated department of a medical school. For only where pharmacology attains the status of a university department do productive workers follow one achievement with another, and only under such circumstances does the subject become a definite element in the medical curriculum.

In but one British institution, University College, London, has pharmacology as yet reached the dignity of a full-time professorship. Cushny's laboratory there, with chemical and physiological divisions, is the only establishment of its kind in Great Britain. King's College, London, indeed claims a professorship, but the incumbent is on duty only during the summer session; during the winter he serves as lecturer in the same subject at Cambridge. Modest experimental laboratories are found at Glasgow and Liverpool; but the professor at Glasgow is a practitioner, while Liverpool devotes only a lectureship to the subject.[2]

Despite the proximity of physiology, there exist two serious obstacles to the experimental development of the subject in the medical school: anti-vivisection legislation, on the one hand, and the strongly empirical leanings of the profession, on the other. Practical classes in pharmacology cannot be conducted with frogs; and the present state of public opinion, as evidenced by existing statutes, permits nothing else. The medical profession has not yet discerned that what it calls the "precise observation of disease at the bedside"[3] is, as a matter of fact, vague and inconclusive: the critical study and teaching of therapeutics involve the acceptance of a radically different point of view. Cushny finds, for instance, two distinct clinical views as to the efficiency of ergot in childbirth. "When I began to look into the question," he says,[4] "I expected to find that each side would have a series of observations, but that these conflicted with each other. But I could find in the whole literature no evidence that any one had ever contemplated such an investigation. Here was a drug,

[1] In its modern form, the subject plays practically no part in French medical education. The instruction in therapeutics is limited to lecture courses conducted by practising physicians.

[2] There is a summer lectureship in experimental pharmacology at Edinburgh also.

[3] Norman Moore: *Medicine in the British Isles*, p. 157 (Oxford, 1908).

[4] A. R. Cushny, "A Plea for the Study of Therapeutics," *Proceedings of the Royal Society of Medicine*, November, 1910, Pharmacological Section, p. 4.

given in thousands of cases each year, the action of which could be investigated with apparatus no more complicated than an ordinary watch, and the action and usefulness of which were in doubt, yet no such investigation stands recorded, the nearest approach to it being the observation that 'the pains were stronger and more frequent.'" The inertia of a self-governing profession thus constitutes the second obstacle to the proper development of experimental pharmacology in medical schools.

In the absence of a modern development within the schools, the teaching of the subject is generally restricted to pharmacy, prescription-writing, and the old-fashioned materia medica, of which Huxley said as far back as 1870, "I must confess that, if I had my way, I should abolish it altogether." The equipment consists of not much more than a collection of drugs, a blackboard, and some simple pharmaceutical utensils. As late as 1906, the quarters at Oxford were described[1] as "little better than a shed." The lecturer's only assistant was a boy who swept out the rooms. All the mechanical work was done by the lecturer. A great part of the apparatus belonged to him, and there was no convenient place to lodge it in safety where his lectures were given. In most schools the instruction is assigned to physicians not otherwise engaged. At Guy's, an assistant physician lectures; the demonstrative classes are held by a teacher who also does duty in two other departments, —physiology and forensic medicine; at the London, there are two lecturers, a physician and his assistant physician, the latter conducting the demonstration and quiz classes; at Charing Cross, an assistant physician gives all instruction in materia medica, pharmacology, and therapeutics; at the Middlesex, the same function falls to the physician to the out-patient department; at Sheffield, where I was informed that "small schools cannot afford pharmacology," one of the physicians to the Royal Infirmary is also medical officer to its skin department, and professor of all three branches under discussion. A different attitude on the part of the profession is not likely to be produced by teaching of the character described. Some way must be devised to break the vicious circle which tends to keep British therapeutics from closer intercourse with physiology and chemistry. What that way is will become clear when we come to consider clinical teaching in Great Britain.

Pathology

In certain important respects the historical situation of British pathology has been excellent. The medical school grew up within the hospital, whose dead-house necessarily became its pathological department. School and hospital were so interwoven as to be indistinguishable; compactness of arrangement facilitated communication between the wards, the post-mortem room, and the museum, to all which the student enjoyed unhampered access. Furthermore, an excellent tradition had been widely established in reference to autopsy. Guy's at London, like the Allgemeines Krankenhaus of Vienna, practically assumed that every case ending fatally would be autop-

[1] In the *British Medical Journal*, June 23, 1906.

sied, and the death-roll now numbers some 700 cases annually. At the London Hospital, 1288 post-mortems were made in 1909; 600 take place yearly at St. Bartholomew's; 500 at the Middlesex; 350 at St. George's; 250 at St. Mary's; 200 apiece at Charing Cross and Westminster. In general, between 80 and 95 per cent of the cases ending fatally in London are autopsied. In Scotland and the provinces, sentiment in reference to the post-mortem is less favorable. Consent must first be obtained. At the Royal Infirmary, Manchester, the annual average now borders on 200; at Liverpool, 150 autopsies—about 50 per cent of the deaths—were made last year; at Newcastle, over 300; at Glasgow, about 250; at the Royal Infirmary, Edinburgh, 470,—55 per cent of the deaths,—from which, however, as we shall shortly see, the University derived little benefit. As the medical schools are, with the exception of Edinburgh and Glasgow, all small, post-mortem material is relatively more abundant than is usually the case on the Continent. It is, moreover, supplemented by material from the wards and operating-rooms, for the clinical laboratory is in England usually a part of the pathological department, or the department of bacteriology closely associated with it.

In this generally admirable situation a rift appears in the light of recent scientific developments and requirements. The hospital pathologists were originally junior physicians or surgeons, whose work in the post-mortem room went no further than morphological or histological examination. From time to time, brilliant observers like Bright, Addison, and Hodgkin utilized to the full their opportunities in this direction by making complete studies in which the phenomena that as physicians they observed at the bedside were correlated with the pathological conditions that they laid bare on the autopsy table. Three notable achievements of this character stand to the credit of these three men; other similar performances might be cited. Unfortunately, glory thus obtained was dangerous; it was apt to result in more practice rather than in more science. What happened to Matthew Baillie at the close of the eighteenth century has from time to time been repeated in the careers of Todd, Bowman, and others since. British pathology lacking definite differentiation has therefore been marked by the maintenance of a close relation with medicine and surgery, and by discontinuous meteoric performance in which the dead-house and the bedside both figure.

Like anatomy and physiology, modern pathology now requires to be constituted as an independent department carried on for its own sake. It is hardly necessary to repeat that such independence does not involve isolation. On the contrary, pathology, like physiology, gains in instrumental significance with every advance made in its own internal development. To this internal development, however, certain elements in the English situation now interpose serious obstacles. English hospitals are maintained by subscription. Praise can hardly exaggerate the devotion with which men and women laboriously procure year by year the huge sums required for their maintenance. Nor is their duty done when the funds are raised; for the hospitals are managed by their patrons, who emulate one another in making them home-like and attractive. Food, nursing, and appointments are therefore all excellent; probably nowhere else in the world is the level of hospital comfort so uniformly high as in Great Britain. What has this to do with pathology? Unfortunately, a great deal. The pathological department—even in the school hospitals—is largely supported by the hospitals; its conduct must therefore take scrupulous account of British prejudice.[1] England happens to be a country where laws governing scientific progress are written, more or less, by those who do not believe in it. Money is even accepted for research on conditions made by ignorant or prejudiced donors that particular methods of investigating will not be resorted to. Nothing can be countenanced by the hospital that is likely to alienate subscriptions; and just at this moment a considerable proportion of the British public are more sensitive about the lives of dogs and guinea pigs than about the lives of men, women, and children. At a time when the pathologist advances beyond morphological and histological work by means of animal experimentation, the pathological department must for the most part forego animal experimentation, and with it all chances of active development along something more fruitful than morphological lines.

In consequence, pathology now occupies in England a somewhat confused position. On its merits it ought to follow physiology in obtaining its own institute, but unlike physiology, it dare not leave the hospital from which it derives inspiration and procures material. Under these circumstances, a medical school must either make a sacrifice or employ a makeshift. Most of the London schools choose the former alternative. They relinquish all endeavor to participate in the modern experimental movement. Their pathological department is a dead-house, in which young physicians and surgeons perform autopsies. Where the amount of material is unmanageably large, specialists are appointed to devote their entire time to morphological and histological work without animal experimentation. The pathologist to the hospital is on this basis usually one of the teachers of pathology in the medical school, and frequently head of the clinical laboratory. His diagnostic aid and post-mortem work keep medicine and surgery in close contact with his department—a thoroughly wholesome

[1] In consequence of the charge that funds subscribed to the hospital were being diverted to medical education, a commission of inquiry was appointed in 1905 by King Edward's Hospital Fund for London. It is clear from the testimony that the outcry originated only in a desire to hamper vivisection still further. The testimony having conclusively established the advantage to the hospital of attachment to a medical school, an anti-vivisectionist witness was asked whether there was any objection to "legitimate expenditure by a hospital upon services rendered by the school in the way of bacteriological and other inquiry." The witness replied in the negative, "provided that those services do not include practices repugnant to a large number of very good people, [and] always provided that it is a service actually for the relief of an actual patient, not an experiment; and provided that it does not involve vivisection, because I do not think that hospital funds ought ever to be used in the pursuit of a practice which a large number of people—the most humane people in the Kingdom—regard with abhorrence." *Report of Committee*, pp. 118, 119 (London, 1905). The entire report is worth reading for the light it unintentionally throws on the undeveloped condition of some members of the intelligent portion of the British public in respect to scientific matters. Sir Cooper Perry, superintendent of Guy's, was asked by a member of the commission (page 36): "Would you say that, even if a hospital had no medical school attached to it, in order to be efficient it would be bound to have some sort of pathological laboratory, if possible, attached to it?" Educational reform suffers seriously from the existence of such innocence in high places.

relation. At Guy's, a separate endowment supports on an academic basis the school lecturer in pathology, as a result of which he may carry on animal experimentation in his school laboratory, while the morbid anatomists in the dead-house do not. In the provincial and Scottish universities, a makeshift arrangement more in harmony with modern tendencies is working out. These institutions have completely taken over the underlying scientific branches; but clinical teaching still remains a perquisite of the hospital staff, in whose appointment the universities have as yet little voice. Pathology, facing both ways, occupies an ambiguous position. As laboratory science, it belongs to the university; as clinical adjunct, it must remain in the hospital. Between the two it hovers dubiously. The hospitals educationally linked to the universities have come to recognize the importance of placing a specialist—not a physician or surgeon, resident or otherwise—in charge of the pathological department; as they themselves are rarely in position to afford the expense, a working arrangement has been made according to which the university appoints and pays a professor of pathology, who becomes ex-officio pathologist to the hospital in which the clinical teaching of the university is done. A single individual thereupon administers a bifurcated department: he has his experimental laboratory at the university; he does his autopsies at the hospital. This arrangement is in force at Manchester[1] and Sheffield. At Liverpool, a similar plan is followed, but, as it appears, on a somewhat informal basis, for the hospital has not yet surrendered to the university priority in appointment; nevertheless, the governors made the present university professor pathologist to the hospital, and as the two institutions are close neighbors on an increasingly intimate footing, there is no likelihood that a combination reciprocally beneficial will be disturbed. The other hospitals in which the University of Liverpool also recognizes clinical teaching have, however, their own pathologists—practitioners, I believe, in all instances. Much the most satisfactory solution has been reached at Glasgow, where the entire pathological department of the university, uniting dead-house and experimental laboratories, is situated on the Western Infirmary lot; the building is a recent structure, admirably adapted to the needs of teaching, research, and hospital routine. The incumbent of the chair is named by a joint committee, of which four members are designated by the university and three by the governors of the infirmary. Perhaps the least satisfactory disposition to be found anywhere exists at Edinburgh, where the pathologist to the hospital and the professor of pathology are two different individuals, having no relations whatsoever with each other.

Despite the fact, then, that Virchow designates John Hunter as the father of experimental pathology,[2] pathological experimentation does not yet flourish in England, except in the department of physiology. The compensatory development noted

[1] The present incumbent is also consulting or honorary pathologist to certain special hospitals also used in the clinical teaching, each of which, however, has its own active pathologist.

[2] Lexis: *Die Deutschen Universitäten*, vol. ii, p. 258 (Berlin, 1893).

in Germany, where pathological physiology is cultivated in institutes of physiology, pharmacology, bacteriology, and in the clinic, has not yet attained any considerable proportions in Great Britain. It is found at Liverpool in the department of biochemistry; at Manchester, in the university laboratory of pathology; at University College, London, and at Guy's, in research departments detached from the hospital dead-house; at Glasgow alone, as far as I observed, is an entire pathological department located on hospital grounds.[1]

Under these conditions, we are prepared to find that differentiation and organization have not proceeded far. The pathologist has not, as yet, everywhere established himself as specialist. The lecturer on pathology[2] in the school is not always the pathologist to the hospital; the differentiated subordinate staff is almost unknown. At Charing Cross and Westminster, the lecturers on pathology are visiting physicians; two assistant physicians are pathologists to the hospital. At University, Middlesex, and the Royal Free, an assistant physician is lecturer in pathology; at the first two, the curator of the museum is pathologist to the hospital. The lecturer on pathology at the London is bacteriologist to the hospital; the pathologist to the hospital has as his assistants several physicians and assistant physicians. The subordinates in the department are mostly doing simultaneous duty elsewhere,—heavy routine duty at that. At Guy's, where the lecturer is a specialist, assistant physicians or surgeons not really belonging to the department of pathology fill the subordinate posts; at St. Bartholomew's, the teacher in charge of chemical pathology was out-patient physician, and physician in charge of diseases of children; the morbid anatomists are medical or surgical registrars, and one of them, chief assistant in orthopaedic surgery, besides. At St. Mary's, the pathological chemist carries an amazing burden; he is out-patient physician, medical tutor, and lecturer on medical jurisprudence, toxicology, hygiene, and public health! At Charing Cross, the demonstrators are assistant physicians. At the London, general and surgical pathology and pathological histology fall to the lecturer in bacteriology; morbid anatomy and special pathology to the head of the pathological institute, but the two parts are apparently in no definite relation to each other. Even in the provinces, where the head appears always to be a professional pathologist, departmental integration is imperfectly achieved: the curator at Sheffield is a physician, the demonstrator a surgeon; the assistant lecturer at Liverpool is physician to one of the hospitals recognized by the university as part of its clinical school. Instead of a compact central department from which lines of communication radiate to every division of the hospital, absence of a comprehensive, clean-cut conception and organization tends to splinter the subject into disjointed fragments. The junior staff members are less closely related to the departmental head in

[1] Since my visit to Glasgow, it is reported that an exactly similar arrangement has been made (1911) with the Glasgow Royal Infirmary, where a second university professor of pathology is ex-officio pathologist to the hospital and director of the pathological institute there.

[2] The lecturer, as he is called in the London hospital schools, is equivalent to the professor in the colleges and universities.

pathology than to the other departments to which they are simultaneously attached, and to which they are really looking for promotion and a career. Temporarily, they are assigned to the pathological aspect of medicine or surgery, as the case may be, but they are not members of the pathological team.

Nor under these circumstances does even the autopsy form the nucleus of a definitely integrated department. Indeed, no uniform practice as to the making of post-mortems prevails. Here, it falls to the hospital pathologist, who is simultaneously curator of the museum;[1] there, to recently graduated medical and surgical registrars; again, to assistant physicians,[2]—conditions that do not even favor morbid anatomy of a generally high grade. Unmistakable is the divorce of morbid anatomy from experimental pathology in the few places where the latter is prosecuted. The lecturer in pathology at the University Hospital School bears the additional title of research director, but he is not pathologist to the University College Hospital; the research that he directs occupies quarters in the school building across the street. The lecturer at Guy's is an experimenter: three assistant physicians are morbid anatomists at the hospital; the professor at Manchester is also of an investigative turn, with a laboratory at the university; the autopsies are performed in the dead-house of the Royal Infirmary by a pathological registrar. In its integrated department, presided over by a professor with two full-time assistants, Glasgow alone possesses an institute in which autopsies, teaching, and research go on harmoniously, under the direction of the chief.[3] It is the only complete organization of the kind that I saw in Great Britain.

Research has, however, also other difficulties to surmount. Funds are extremely scarce. A recent endowment will still further stimulate investigation at Guy's. Elsewhere, lack of resources is seriously restrictive, even where facilities and ideals exist. The research director at University College will inevitably, unless his research post is better supported, be forced out of research into practice; his co-workers are Beit scholars or cancer workers belonging to Fulham Hospital. A single investigator was noted at St. Bartholomew's; five workers were engaged in research at Glasgow, all supported by outside grants; should these grants be withdrawn, their work would cease. At Middlesex, a special endowment maintains cancer research. In general, however, it is fair to say that pathological research in Great Britain is precarious and personal. The conditions do not make for it. A keen man who can snatch an hour here and there may, if persistent, turn out a piece of work; a student, too, if he has resources of his own, or obtains—and retains—a scholarship or grant. But the teacher has got to contend against diverse employments and a deadly teaching routine; the student against insecurity of support, lack of facilities, and weakness of ideals. Under no such conditions will the severed members of British pathology be reunited and inspired with the breath of life.

[1] As, for example, at University College Hospital.

[2] As, for example, at Guy's.

[3] The same may now be said of the second pathological institute. See note 1, preceding page.

The provision for pathology consists essentially of the post-mortem room, with adjoining space for microscopical work, and a museum. At St. Bartholomew's, a pathological building has recently been erected, in which four floors are devoted respectively to clinical pathology, morbid histology, and bacteriology, chemical pathology and the library, and autopsy work. In the handsome school building erected by Sir Donald Currie for University College, London, attractive and somewhat extensive provision is made for investigation in physiological pathology. The modern establishment at Glasgow already mentioned has been further supplemented with a separate attractive and convenient laboratory for clinical pathology under a director appointed by the university. With these and perhaps a few other exceptions, the pathological department of the hospital is practically a dead-house. Everywhere, however, the abundant material has been conscientiously and skilfully utilized in the formation of a museum. The impetus toward the upbuilding of collections came from John Hunter, whose valuable collection forms the nucleus of the superb museum of the Royal College of Surgeons in Lincoln's Inn Fields. Guy's has assembled some 8000 specimens, beautifully mounted and carefully catalogued; St. Bartholomew's has some 7000; Middlesex, 5000, among them some of the handiwork of Sir Charles Bell; St. Thomas's has 3000, among others, the specimens used by Sir Astley Cooper in his work on dislocation, fractures, and hernia; St. Mary's has 3000; Charing Cross, 2800; and King's College Hospital, 1900. These collections play a great—unfortunately not in all respects a wholesome—rôle in the pathological instruction.

The character and content of the teaching are determined by the considerations so far brought forward. Pathology is regarded as an incident to medical and surgical practice,—a way of elucidating certain structural factors that physicians and surgeons must regard. Though denominated a separate subject, it is in England largely taught by men to whom it has not even provisionally a separate existence. Except at Oxford and Cambridge, it does not constitute a subject for examination, figuring only incidentally in the medical and surgical examinations conducted by physicians and surgeons,—an excellent thing in so far as the subject is brought to bear on clinical problems, and the curriculum is held together, rather than dispersed into non-interacting separate units; but damaging in England because at no period in its study, as in no moment of its cultivation, does a freer breath blow upon it.

Pathology being for the most part dead-house and museum pathology, rather than a physiological study of pathological process, its teaching is mainly concerned with explaining the dead signs of something that has taken place. Lecture and demonstration courses dealing with general and special pathology and histology are everywhere given. But the brunt of the teaching falls on the museum and revision teachers. The collections are arranged along uniform lines; typical sets of specimens illustrate medical, surgical, and gynecological pathology; they are classified in separate divisions, labeled, and descriptively catalogued. The student purchases a catalogue and verifies its description by repeated inspection of each set. His tutor laboriously drills him in this purely imitative observation, until he acquires a high degree of mechanical expertness in recognizing ordinary lesions in a pickled or preserved condition. How much he is thereby assisted in dealing with fresh material is a question, the value of the instruction depending very largely upon just that. For sound training in abnormal anatomy aims at the interpretation of fresh material. The proper use of a museum is incidental and supplementary: it is a reservoir from which additional or analogous specimens may be drawn by way of exhibiting conditions similar to, or likely to be confused with, the particular lesions disclosed by autopsy.[1] The juxtaposition of fresh and preserved specimen lends emphasis or compels comparison, distinction, interpretation. The museum specimen alone, as thing-in-itself, is at once fragmentary and misleading. It may be made a means of communicating a certain amount of information; but how far are the student's active powers stimulated and directed by the English usage? Consider for one moment: A collection has been made that covers the ground. A student who "knows" it will be familiar with the specimens submitted to him at the examination. It is none the less mechanical and routine teaching because it deals with objects. Objects as such no more connote thought than do words as such. Objects have an advantage over words only because they are usually associated with practical difficulties that coerce thinking. But information procured by merely verifying on objects the contents of a card index stimulate the thinking-process little more than definitions learned from an illustrated text-book. In such circumstances, the museum is only a text-book to be learned. The energy that goes into this museum teaching is assuredly to no slight extent misapplied.

Much the most valuable part of the student's training he gets through the post-mortem clerkship. For periods varying from one to three months, he is privileged to spend half the day in the dead-house, where he witnesses the autopsies, writes up the protocol, examines specimens, and generally assists in the work. Systematic autopsy records are everywhere kept, closely articulated with the clinical records of the hospital. The student thus handles fresh material under conditions that point many a medical and surgical moral. This most valuable experience he still further increases when, as clinical clerk or surgical dresser,[2] he follows to autopsy such of his cases as have terminated fatally.

Of the rest of the teaching, there is little to be said. Medical pathology, surgical pathology, etc., are laboriously inculcated with the aid of museum specimens, and fresh material is demonstrated weekly or oftener. Between service in the out-patient department, in the clinical laboratory, at the autopsy table, in the museum, and their tutorial classes, the junior teachers are fairly exhausted day after day. Meanwhile, the students pursue all alike the same course. Even at Manchester or Liverpool, pathology holds out no inducement like physiology to pause long enough to do something aside

1 Rare conditions, not regularly encountered in the dead-house, may have to be presented in the form of preserved specimens. But this is a distinctly unsatisfactory, even though unavoidable, substitute.

2 See chapter viii.

from the beaten path. Pathology is not a B.Sc. subject. Little more opportunity is usually offered than all are practically required to take.

None the less, I am far from wishing to convey a merely unfavorable impression of the facts and possibilities of English pathology. The materials lie close at hand for an easy reconstruction. Where clinic and post-mortem are together easily accessible to both instructor and student, where collections exist and physiological science is highly developed, a few bold strokes would at once transform a more or less unsatisfactory into a highly satisfactory situation.

I have so far left Edinburgh out of account: there, conditions are so much worse than anywhere else that it requires a paragraph to itself. The medical faculty of the university teaches medicine and surgery in the wards of the Royal Infirmary; but with the pathological department of the Royal Infirmary the university has no connection. The professor of pathology in the university is a visiting physician to the infirmary; the pathologist of the infirmary is teacher of pathology in the Extra-Mural School. The pathological department of the university cannot even call its pathological collection its own: for it is housed in the anatomical museum, to which the pathologist does not even carry a key! In the catalogue account of the courses in pathology at the University of Edinburgh, the words "autopsy" and "post-mortem" do not once occur.[1] University students are forced to resort to the extra-mural teachers for their post-mortem work. But the abundant material of the infirmary so fully occupies its inadequate staff with routine that they have absolutely no time for research; the teaching is altogether of stereotyped character. Post-mortems are largely the work of the house pathologists. Of the disadvantages of local competition in medical education measured by scientific standards there could hardly be a more striking instance. The only really active laboratory in Edinburgh is the independent research laboratory of Professor Ritchie, not a part of either school. This institution subsists on the income derived from routine analyses done for the profession, and on subsidies devoted to research in neuro-pathology and parasitology; it lacks clinical connections. Obviously, a modern pathological institute will not exist in Edinburgh until these three disconnected fragments are welded together in the university.

Somewhat singularly, the most prosperous of British Medical Schools in recent years has been the school at Cambridge. The Cambridge and Oxford schools give only half the course, viz., the basic and the medical sciences,—physics, chemistry, biology, anatomy, physiology, pharmacology, and introductory pathology, students proceeding to London for the rest; but both universities possess complete facilities, not only laboratory, but clinical. At Oxford, Radcliffe Infirmary with 180 beds is closely affiliated with the university; at Cambridge, Addenbrooke's Hospital with 150 beds. This is highly interesting as embodying the only terms on which a partial school can be satisfactorily conducted. The preliminary sciences,—physics, chemistry, and biology,—if the view previously expressed is correct, belong properly to the student's general

[1] Catalogue, 1910–1911, pp. 498, 499.

education. Anatomy and physiology may perhaps be taught without clinical association, though probably not even then without a certain loss; but pathology is entirely impossible away from the dead-house of a hospital. Fresh material is required from the first; and fresh material is not otherwise procurable. The plan of instruction followed at Cambridge is capable and worthy of imitation: experience has indicated that a knowledge of pathological and bacteriological principles is of great use to students if acquired previous to clinical work in the wards. From the hospital at hand they procure the requisite material, and at the same time are introduced to elementary methods of physical diagnosis. Pathology binds together the two parts of the medical curriculum,—hence neither part can exist without it, or without the sources whence its fresh supplies are drawn. This dual relationship is further recognized in the Cambridge examinations, as we shall hereafter see:[1] a separate examination in general pathology must be passed before the clinical years, while medical and surgical pathology constitute parts of the final examinations in medicine and surgery respectively.

Conditions in France leave much to be desired. Pathology and the hospital we have found to be inseparable. But in France, the organization of the medical school rules out the requisite interlacing. The hospitals are not organic parts of the medical school. At Paris, in each of a dozen institutions, managed by the Assistance Publique, wards are assigned to certain professors in the medical faculty. At Lyons and Lille, the same arrangement exists on a smaller scale. The autopsy work in each hospital falls to internes who have no relation to the professor of pathology, who gives his lectures at the distant École de Médecine. The threads thus fall apart. Instead of a pathological institute belonging to the university, there are hospital dead-houses, scattered through the city and disconnected from the university and from each other; in these dead-houses, the hospital internes enjoy unrivaled opportunities to study morbid anatomy,—opportunities of which the best of them take full advantage. Meanwhile, the university chairs of pathological anatomy, experimental and comparative pathology, general pathology and therapeutics, surgical and medical pathology, are all occupied by men in active practice, who simply lecture at the school. To each professor is attached a helper, who arranges his lecture demonstrations with preserved material, and a laboratory chief, with assistant and helper, who has charge of the research laboratory assigned to the chair. The instruction is mainly by demonstrative lectures, though brief practical courses are offered from time to time. For example, a practical course in histological technique is offered by an *agrégé* and *préparateur*, open to physicians and matriculated students, for 50 francs per trimester; similarly, a three months' course in pathological histology, "the number of places limited;" a third consists of ten exercises in histo-bacteriology, costing 60 francs. Under these conditions, undergraduates will not largely participate, nor are the material facilities at all adequate to general participation. The defects of these arrangements have long been deplored as anachronisms, surviving from a time when pathology had not yet attained its majority. As far

[1] See chapter xi.

back as 1880, a committee, one of whose members was Charcot, worked out a scheme for an Institute of Pathological Anatomy; it was designed to be the clearing-house to which the hospitals should contribute their material, and in which medical students should be trained in pathological anatomy, histology, and chemistry. With the approval of the faculty, the project was formally submitted to the ministry by the dean, but, as Prévost mournfully remarks, "the institute of pathological anatomy remains in the stage of project."[1]

Bacteriology, Hygiene, and Legal Medicine

The remaining topics do not require extensive comment. The position of bacteriology is not easily defined on account of its intimate yet various association with pathology and the clinical laboratory. At St. Bartholomew's, St. Mary's, St. Thomas's, Westminster, and at Sheffield, the subject is closely attached to pathology; at Guy's, University, Middlesex, and Charing Cross, rather with the clinical laboratory. At London Hospital, it approaches more nearly the status of independence, though the departmental head is school lecturer in general pathology, also; the variations are, however, of no great importance because, with rare exceptions, the departments devote themselves to school and hospital routine. Their scope is narrow; the subject is not viewed as the nucleus of a hygienic institute, but rather as a diagnostic resource. The staff is small; the burden of clinical examinations for the hospital, and occasionally, as at Middlesex, for the outside profession besides, onerous; and the teaching, though limited to brief courses, incessant. Funds applicable to research are scarce. Most favorably situated is the Lister Institute, with an endowment of £250,000, the income from which fund is supplemented by fees received for services rendered to municipal and state health authorities and by the profits derived from the manufacture of sera. Its surplus of time and money is devoted to research; four or five workers are also maintained by special grants. Neither hospitals nor medical schools are, however, financially strong enough to patronize research, or to protect the time of the laboratory chief. Grants and scholarships in small number must be mainly relied on. The equipment, as a rule, is adequate to its purposes: at the London Hospital, more than adequate; at Charing Cross, rather less. At King's College, which boasts the first English laboratory devoted to bacteriology, and at Cambridge, the provision is especially satisfactory; in both places there is an eye to research.

Instruction proceeds by means of lectures and parallel practical exercises, in the course of which the student cultivates the commoner organisms in media and examines films and sections. The teacher is grievously hampered by the prejudices of hospital subscribers and by the anti-vivisection laws. The statutes require that both persons engaging in, and places used for, animal experimentation must be licensed. As hospital governors are usually hostile or unsympathetic, neither experimental nor demonstra-

[1] "L'institut anatomo-pathologique est demeuré à l'état de projet." Prévost: *La Faculté de Médecine de Paris*, p. 54 (Paris, 1900).

tive work can be performed on hospital premises, though a rabbit inoculated elsewhere may be procured and subsequently exhibited. How much teaching a particular student gets depends altogether on the body before which he expects to qualify: the average London student attends a three months' course, sometimes in conjunction with clinical microscopy; Cambridge and Oxford men get three months more.

I have repeatedly pointed out the inestimable advantage of closely interlacing medical school and hospital. Where, however, funds are short and ideals undeveloped, this intimacy is apt to lead to highly undesirable makeshifts. Time and energy which perchance escape from hospital routine are at once pounced upon by school routine: the young surgeon is drafted by the departments of anatomy and pathology; the young physician by the school physiologist; the bacteriologist by the clinical laboratory or the Department of Public Health. What with hospital and school routine and the differing demands of the examinations, it is small wonder that English medical schools are as a whole unproductive.

To this generalization, two exceptions at once suggest themselves, both tending to confirm the point previously made, viz., that the development of a scientific branch depends in the first instance on the momentum contributed at a favorable juncture by an individual with ideas. Two such contributions have recently been made in England, and both have proved decidedly stimulating, — Sir Patrick Manson's in the realm of parasitology, Sir Almroth Wright's in the direction of therapeutic inoculation. Lectureships in Tropical Medicine have been widely established in British medical schools. Sir Patrick Manson himself lectured at St. George's, Charing Cross, the Royal Free, as well as the London School of Tropical Medicine. The last named, located at the docks, adjoining a branch hospital of the Seamen's Hospital Society, with fifty beds, is occupied in training men for tropical residence and service as well as with tropical research. Bacteriology and animal parasitology are systematically taught; the hospital furnishes material, clinical experience, and autopsies. The Liverpool School, affiliated with the University, discharges the same functions, and in addition has made a feature of expeditions to tropical countries. Its laboratories and an excellent museum are admirably placed beside the university laboratories of bacteriology, hygiene, pathology, and bio-chemistry, and it controls a ward of twelve beds in the Royal Southern Hospital, close to the docks; research is supported by special gifts, its own funds, and governmental subsidy. The school has sent out more than twenty expeditions for the study of malaria, trypanosomiasis, yellow fever, etc., as well as to carry out prophylactic measures in the colonies. It publishes two important series of memoirs and annals.

At Liverpool, Manchester, and Edinburgh, bacteriology forms, as in Germany, the nucleus of a hygienic institute. The Manchester institute, the most extensive of the three, supports itself by working for municipalities, practitioners, etc. In 1908–1909, 5477 examinations were made in the laboratory for diphtheria, 2024 for typhoid, 2417 for human tuberculosis, 787 for bovine tuberculosis. Its income from work of this nature, something like £3000, goes to keep up the institute and to promote investigation in the line of municipal and house sanitation. Elsewhere in British medical schools the stimulating association of bacteriology and hygiene in a single institute has not yet taken place. The medical schools furnish instruction in public health, contributed by a visiting lecturer and consisting of discourses on such topics as housing, sewerage, water-supply, epidemics, vital statistics, etc. Candidates for the special Public Health Diploma, required of sanitary officials, must take additional courses in chemistry and bacteriology; but these future guardians of public health cannot, during their training, inoculate a rat or a guinea pig without encountering the penalties of the anti-vivisection laws!

In France, the practical teaching of bacteriology appears to be left by the universities to the Pasteur Institutes, where such exist in university towns, as is the case at Paris and Lille. At the latter, Calmette, director of the Pasteur Institute, also occupies a professorship in the university; in consequence, the university instruction in hygiene and bacteriology is transferred to the Pasteur Institute, where the facilities are thoroughly admirable: fourth-year students receive there excellent practical instruction amidst an active scientific environment. At Paris, no official connection between the Pasteur Institute and the university has been brought about. The university provides instruction in parasitology; latterly, too, an Institute of Colonial Medicine has been established along the lines of the English Tropical School: in the university, laboratories of pathology, parasitology, and hygiene, and in the hospital of Auteuil, appropriate courses are given to graduates and final-year students in bacteriology, hematology, tropical pathology, epidemiology, etc. But the active centre of bacteriological teaching and research at Paris is the Pasteur Institute, not the university: spacious class-rooms are there provided, with individual equipment, animal-houses, distinguished investigators, and a stimulating atmosphere. A large class—mostly mature workers—annually attend the winter courses given by Roux, Metchnikoff, Besredka, Laveran, and others in coöperation. Lyons alone is now developing within the university a modern department of hygiene, though it is not yet in position to command the entire time of the professor. On the other hand, parasitology is in France a separate department; in some universities, Paris, for example, extremely active, though with meagre support. While mainly concerned with research, the department offers a brief practical undergraduate course which is compulsory.

Institutes for legal medicine in something like the Austrian sense exist only at Edinburgh and Paris. At Edinburgh, the chair is incorporated in two faculties, law and medicine. The present incumbent, like his predecessor, holds the office of police surgeon to the municipality, a connection which insures the university a steady stream of material for the purposes of instruction and investigation. As police surgeon he sees — and as professor exhibits to his students — cases of assault, alcoholic excess, drug habit, incipient insanity, violent death, etc. The course, required of all students, does not aim to make medico-legal experts; but it enables physicians to discharge creditably their public duties as medical men in relation to the law of the land. It is held to be important that they should be able to deal intelligently with problems which may face any medical man. They must, for example, "know how to observe the essential details in case of death from violence, to investigate a case of alleged rape, to determine the presence of blood on clothing, to give an opinion as to whether a newly born infant has lived, to perform post-mortem examinations."[1] The lecture room, the museum, and the public mortuary afford the requisite facilities for such instruction.

In the absence elsewhere in Great Britain of a working connection between the university and the police authorities, legal medicine amounts usually to little more than a perfunctory lecture course of didactic nature by a teacher with or without particular interest in the topic. At Liverpool, the course falls to a clinician; at Glasgow, it is merged into Public Health; in London, one encounters a highly picturesque variety, due to the economic necessity of devoting to a new routine scraps of time saved from previous occupation of the same quality; at the London, the instruction in legal medicine is shared by two men, one otherwise attached to teaching and outside work in Public Health, the other, a physician, lecturer in clinical medicine and visiting pathologist; at Guy's, of the two instructors, one is also pharmacologist and assistant physiologist, the other assistant physician and morbid anatomist; staff physicians teach legal medicine at University College and St. Bartholomew's, out-patient physicians at St. Thomas's and Middlesex, the pathologist at St. George's; at St. Mary's, the subject falls to the obliging instructor, who gathers up the remnants of pathology and hygiene while carrying on tutorial classes in medicine and doing duty in the out-patient department!

In Paris, the chair of legal medicine, created in 1823, has, since 1877, been attached to the somewhat remote morgue, where the prefect of police, by arrangement with the faculty, has provided facilities for instruction. The material is enormous in quantity and variety,—1422 dead bodies were carried thither in 1911. The topic for the day's lecture is determined altogether by the contents of the mortuary: now a case of infanticide, again a case of poisoning or injury, will furnish the text. A laboratory of toxicology, situated at the prefecture of police, also belongs to the department.[2] At Lyons, an excellent establishment of the same character has been recently erected in close proximity to the other laboratories of the university.

Conclusion

Discussion of the organization of medical education in Great Britain and France cannot be complete until we have examined the clinical conditions. But the reader will already have remarked the unevenness of the laboratory development as compared

[1] Private letter from Professor Harvey Littlejohn.

[2] The details of the arrangements between the medical faculty and the morgue are given by Prévost, pp. 37-39.

with Germany. Now, in Germany, it is found that relative homogeneity of ideals and facilities is entirely consistent with great disparity of scientific eminence and pedagogical skill: though the student will hardly have to endure radical defects anywhere, he is not only free, but encouraged, to seek larger or more congenial opportunity by moving at intervals from place to place. In France and Great Britain, on the other hand, where a modern medical school can be conceptually created only by piecing together features from several schools, the student permanently suffers the deficiencies of the institution to which he commits himself at the outset. Assuredly it is business, not education, when the English medical school appeals to the loyalty of the student, skilfully played upon by social and athletic inducements, rather than stimulates him to seek his own advantage and the advantage of medical science by attaching exclusive value to scientific opportunity and achievement.[1] Whatever the reason, an English boy begins his medical course at Manchester, let us say, where the preliminary sciences and anatomy are thoroughly satisfactory; why should he not emigrate to University College for physiology and pharmacology,—the latter accessible almost nowhere else? Such an adventure never enters his head. What happens, then, is this: a good part of his instruction is provided for in every school by makeshifts of a decidedly depressing sort. He gets excellent instruction in this branch or that; in half a dozen others, he is taught by men whose heart and hopes lie elsewhere. Student and instructor are alike wrecked. The teaching is second-hand, probably shop-worn, lacking conviction and range. The student is habituated to "requirements." What incentive has he to reach out, when his incidental and accidental teachers cannot and do not? Good teaching is infectious; but to communicate infection, the teacher must himself first be stung. Circulation of students in search of opportunity would put upon the British medical schools a pressure that they could not resist: for they must either meet scientific competition or collapse. As long, however, as school loyalty is a cohesive force powerful enough to maintain intact an enrolment once procured, medical schools, appealing to immature youths, may compete by means of club-rooms and athletic fields more effectually than with laboratories, and less expensively.

This is, of course, only to say that in order fully to become educational, the medical school must first wholly cease to be commercial. Personal pecuniary and professional interest keeps alive eleven medical schools in London, and struggling, poorly attended schools in each of the provincial universities. And within the London medical schools, the move to concentrate scientific instruction is resisted in part by the teachers whom consolidation will dispossess of laboratory headship. That medical education in the metropolis can be modernized by the halfway measures which leave clinical instruction as and where it is, while bringing together the laboratory branches in three centres as has been proposed, I do not for one moment believe. Concentra-

[1] Oxford and Cambridge are exceptions, for they frankly recommend in respect to clinical instruction the superior facilities to be enjoyed elsewhere.

tion would undoubtedly improve matters by pooling fees for the maintenance of fewer laboratories, thereby sustaining several fairly complete staffs instead of nine fractional organizations. But it is a mistake to suppose that in any case modern laboratories of anatomy, physiology, or pharmacology can be supported out of student fees. The concentrated medical institutes relying upon them would still be routine affairs, with overworked chiefs and assistants drafted for short periods from out-patient clinics. Moreover, if, to play fair, the central institutes were equally remote from all the teaching hospitals, the scheme would involve sacrificing the integrity of the medical school as an organic whole. Anatomy and pharmacology are doubtless worth cultivating in isolation rather than not at all; but a solution conditioned upon their isolation denies to them the stimulus of the clinic, and deprives the clinic of immediate interaction with the influences from which its reorganization and regeneration must eventually proceed. Centralized teaching laboratories of the medical sciences would resemble a bridge minus its farther approach: a structure ending in mid-air, instead of a pathway over which the student would be inducted into the hospital wards,—a broad avenue by means of which laboratory scientists and scientific physicians might secure unimpeded communication with one another. It would have been fortunate had the concentration plan failed on account of attempting too little. As a matter of fact, the project failed, not because it was not sufficiently comprehensive or because it was conceptually defective, but because it appeared likely in the end to assist certain clinical schools rather than others, and because in some instances it involved reduction of rank, perhaps even cashiering. The hope of English medicine lies at this moment in the laboratories; and, in general, the laboratory men have sound ideals. But even they will fail to modernize English medicine unless in destroying the commercial, they also sink the personal, point of view.

In France, two serious obstacles exist,—the preponderance of clinical teaching and the preponderance of Paris. Let us devote a word to each.

The overwhelmingly clinical character of French medical teachers goes far to suppress the laboratory branches in any active sense. In practically all theoretic branches outside of Paris, and in most of them in Paris, chairs are held by prominent practitioners who are also teachers of clinical medicine; an eminent pediatrist is at Paris professor of pharmacology; a famous neurologist is professor of pathology; the chair of history of medicine has just been filled with a pathological anatomist. Specialists cannot be developed as long as the *agrégé* system maintains its present form. The *agrégé* is appointed for nine years, at the termination of which period he drops out, unless, perchance, he receives a professorship. He dare not, as a rule, risk his future by devoting himself wholly to physiology or pathology; he must build up a practice against the day when he is automatically dropped from his academic post. This incidental treatment of the medical sciences is paralleled by the treatment which they receive in the student's time-card. At no period of the student's career has a laboratory a first lien on his attention. Even in his first year, dissection is placed in the afternoon, in order that he may be free to follow the clinics in the morning, if he will. These conditions do not make for research; and where active research has not established the inherent worth of a given branch, teaching recognizes it only in stepmotherly fashion. "The student need not worry about methods; he need only learn results," remarked a Paris professor. The teaching of physiology, pharmacology, and other underlying sciences is mainly expository; between the laboratories and the clinics there is little stimulating intercourse. To all intents and purposes, the French schools are thus still clinical schools.

The domination of Paris is perhaps to no small extent responsible for the persistence of this point of view. Where Berlin and Vienna find themselves hard driven to provide practical laboratory training for their students, Paris may well confess itself overwhelmed. If modern medical education be interpreted as involving practical laboratory training in a liberal spirit organically related to clinical training of the same type, the problem of Paris is perhaps soluble only through decentralization,—a solution for which an instrument is at hand in the provincial universities. Their small size gives them a great advantage over Paris, for they are not too clumsy to introduce reforms,—provided, of course, the consent of the government can be obtained. In the provincial schools the "block" system, on which the laboratory branches engage the student's entire time and attention for two years at least, is at once feasible without complete aloofness from the clinical side. An experiment along these lines would require that the earlier teaching be confided to specialists. Revision of clinical instruction would in course of time result, for more fundamental scientific training forces ultimately a corresponding readjustment in clinical instruction. That, we shall now see, has taken place in Germany, where clinical education promptly adopted the ideals and availed itself of the resources that the laboratories had worked out; and that in all probability will take place in Great Britain and France when once English and French laboratories gain their appropriate recognition and development.

CHAPTER VII

CLINICAL INSTRUCTION: GERMANY

The profession of teaching, like the profession of law or the profession of engineering, is in general supposed to be important and exacting enough to occupy fully a man's time, energy, and capacity; otherwise, teaching would not be a profession at all. The present chapter regards clinical teaching from this point of view. It assumes that in a soundly organized university the medical faculty is in the position of any other faculty,—that of arts, of philosophy, or of science; that within the medical faculty there is no distinction in kind between the professors of the fundamental or theoretical branches—anatomy and pathology, for example—and the professors of the clinical or practical branches—medicine, surgery, and obstetrics. The professor of medicine or of surgery is indeed a physician; but from the standpoint of educational ideals and activities, this is of secondary importance. He is first of all a university professor; that title indicates his dominant and consuming interest.

If, now, the teacher of medicine is a teacher in precisely the same sense in which the chemist or the mathematician is a teacher, then his workshop, the hospital, is only another sort of laboratory. Set down the conditions which the chemist requires in his laboratory in order to teach and to investigate: the same conditions, and only the same conditions, will enable the clinical professor to produce corresponding results. I am speaking of course of essentials. It matters not whether the chemical laboratory occupies a rented or an owned building; whether it is of boards or of marble. It matters profoundly, however, who selects the chemist and for what reasons, and whether any outside authority, unsympathetic with his main purpose, sets limits to his freedom, interferes in his choice of associates, or whether the chemist himself is only incidentally engaged in teaching. It is, by the same token, immaterial where the legal ownership of the university hospital be lodged, whether in the state, a municipality, an association, or in the university; but it is highly important that, whatever the nature of its legal relationship to the university, the professor of medicine should be selected on the same basis as the professor of chemistry, that he should occupy precisely the same attitude toward teaching as a profession, and that he should work in the hospital under no other limitations than attach to the chemist in his laboratory.

Now, as in the Middle Ages, the German professor is essentially a wanderer. A student here, an assistant there, a docent elsewhere, finally a professor somewhere else, his commonwealth is an ideal one, his abode there, where his fellows are gathered together. All German-speaking lands form in this respect a *Zoll-Verein* within which academic free trade obtains. The German clinician is in this highly characteristic sense thoroughly a teacher; he roves as rove his philological and philosophical colleagues. He is not nominally or incidentally, but actually, a professor. Long since he took with open eyes the risks of the academic career; for many years he endured its hardships. It is indeed difficult to find a professor of medicine, surgery, or any other clinical branch who is deeply rooted in the soil in which he is now found. They have as a class been called to their present posts from less important positions, in which they have previously demonstrated their worth.[1] Recognition is the powerful and uninterrupted stimulus which the German system applies. The German produces, and continues to produce, because performance alone obtains results: without it, no fortuitous advantage avails; with it, fortuitous advantage is superfluous. A characteristic career will thus be associated with half a dozen universities, successively attracting an able man by superior opportunities and inducements. Friedrich Müller, after studying at Munich, Tübingen, and Würzburg, has taught at Würzburg, Berlin, Bonn, Breslau, Marburg, Basel, and Munich, besides declining calls to Greifswald, Berlin, and Vienna. Vacancies in the clinical faculty are filled as vacancies in other faculties are filled — with men who add lustre to the university. The prizes seek out the competent.[2] The professor of surgery at Leipzig lives at Leipzig because he is a professor of the university there; he is not a professor of the university because, first of all, he happened to be practising his profession in Leipzig. The 3600 physicians of Berlin, among them doubtless many very able men, lay as such no claim to the high places in the medical faculty of the university there; of the present holders of full professorships, every one was called from outside, — from Göttingen, from Graz, from Heidelberg, from Greifswald, — posts which had themselves been reached only after a long and arduous upward progress. Inbreeding is utterly unknown.

This unhampered circulation of the professor has been a highly important factor in the rapid and general renovation of clinical teaching in Germany. Uniformity of law, which permits only a single type of school, is consistent with considerable diversity in respect to plant, equipment, and endeavor. The "call" forces everywhere substantially the same level. A first assistant at Berlin is invited to fill a vacant chair at Greifswald. The promotion is itself an important one; but already the rising scientist looks further, — to Breslau, perhaps, to Heidelberg, or Munich. His career, however, will stop short at Greifswald unless he there win distinction commensurate with the previous performances that have carried him thus far. His acceptance is therefore conditioned upon improvements, extensions, and support, that will provide him as good facilities as he possesses in his inferior post. The medical clinic at Marburg — the

[1] A single exception came to my notice. Poppert, professor of surgery at Giessen, has passed his entire career there: obtained his degree in 1886; assistant until 1894; docent, 1889; extraordinary professor, 1892; professor and director of clinic, 1900. A few others may be cited, but they are in any case very rare.

[2] Politics and religion do, however, count. Hebrews and social democrats are not called to full professorships; in some states chances favor a Catholic, in others a Protestant. See Eulenburg: *Der akademische Nachwuchs*, p. 54. Faculty vacancies are filled in this wise: the faculty nominates three persons to the ministry; the minister may appoint one of the three or go outside the list. He usually takes the first nominee. While this method may lend itself to cliqueishness, the appointments are generally made on the basis of merit alone, subject to the political or religious bias above mentioned.

first of a series of new clinics, begun twenty years ago and now just approaching completion — is at this moment vacant; rebuilding on thoroughly modern lines is the condition on which alone it can be acceptably filled. A Würzburg professor has recently been called to Göttingen; the Bavarian government retains his services at the price of facilities at least equal to those which Prussia offered. A more thoroughly wholesome competition cannot be devised. Assuredly, it has been one of the main agents in bringing about the complete modernization of its hospitals which is one of the most striking features of modern Germany. Remarkable industrial prosperity has had to provide the means; efficient rulers have had to conceive and put through the projects. But the quick diffusion of sound ideas must, in the first instance, be ascribed to the migratory character of the German medical teacher and hospital director.[1] Nor do university hospitals form a class by themselves in this respect. Municipal institutions in both university and non-university towns participate in scientific competition. In equipment and organization, they follow the lines of the university clinics. Their clinical directors are salaried officials, not infrequently called from other towns or from universities; continuous service, excellent laboratories, and abundant material enable them to win in a city hospital such scientific distinction as often leads directly from municipal service to high university posts: Von Noorden, first assistant in the medical clinic at the University of Berlin, was called to Frankfort to be physician-in-chief to the municipal hospital; his achievements there in the pathology and therapy of metabolism resulted in 1906 in a call to the chair of medicine in Vienna. His, now head of one of the medical clinics at Berlin, was chief physician to the city hospital of Dresden, before becoming in 1902 professor in the University of Basel; Koenig was lately summoned from the municipal hospital of Altona to the chair of surgery at Greifswald; Minkowski went from a similar medical position at Köln to the same university, a few years later accepting his present post at Breslau. Brauer, on the other hand, has just retired from the professorship of medicine at Marburg to become director of the medical division of the city hospital of Hamburg.

From the explicitly professorial character of the German clinical teacher all else follows. He is a state official, hedged about with the dignity of high office. Inferiors and subordinates treat him with conspicuous deference. He is "Herr Professor" outside as well as inside the university, not "Herr Doctor." His devotion to science and teaching has thus far, as a rule, sustained the professorial rôle. In general he has spent as many hours in his hospital as the scientist in his laboratory; he has taught as hard and produced as much. Daily lectures at eight o'clock or earlier are not uncommon, after

[1] One offset ought perhaps to be mentioned. Sometimes a professor is called so quickly from one post to another that he leaves before making himself felt. Thus a certain instability now and then results. For example, at Greifswald, since 1900, four professors have in rapid succession filled the chair of internal medicine: Krehl, 1900, called to Heidelberg, 1902; Moritz, 1902; Minkowski, 1905, called to Breslau, 1909; Steyrer, 1909. Practically the same is true of surgery: since 1899, the chair has been occupied by Bier, called to Berlin; Friedrich, called to Marburg; Payr, called to Königsberg, and now by Koenig; after a year at Königsberg, Payr has been called to Leipzig. But this occasional instability weighs little against the enormous advantages of the custom.

which ward rounds are made and laboratory conferences held. One o'clock may find the clinician or surgeon still at work in his clinic; not infrequently he returns in the afternoon. The best type of German clinician thus applies himself without stint to the care of his patients, to teaching, and to research. His pride is to be known as teacher; his fame as teacher satisfies his ambition and fills his purse—as far as it is ever filled at all. A prominent professor disclosed to me the sources of his income: \$300 as hospital physician, paid by the city; \$2000 as professor, paid by the state; \$5000 in student fees. He also does some consultation practice in the afternoon. There is, however, a growing suspicion that the idealism of the clinical professor is yielding to the temptation, perhaps the need, of increased income. Assistants are scarcer than formerly when the deprivations attendant on the scientific career were less deterrent than they now appear to be. The scale of living has been altered by industrial prosperity; new ideals, material in character, are creeping in. Socially speaking, professorial station and a large income make together a formidable combination. The physiologist or the mathematician has no temptation to resist. His income as teacher cannot be amplified, except through success as an investigator. The material motive, if existent at all, drives him back to his students and his laboratory. Not so the clinician. Having once attained distinguished position, an extensive and lucrative practice can be built up on the basis of scientific achievement in the past. The income from this source and the social position that goes with it tend to withdraw him from personal activity in the wards and laboratory, and from close personal contact with his students. In the laboratory he supervises; to the students he lectures. In these circumstances, the assistants do the detailed ward work, conduct research, and give the students whatever individual training they get. Instances of such demoralization are still exceptional; in the main, the clinical professor is loyal to the academic tradition. It is worth asking, however, whether, especially in great cities, the tendency to exploit university clinical positions may not require to be checked by concentrating the professor's activities in his clinic, exactly as the physicist's are concentrated in his laboratory; what with examining, teaching, administering, and looking after the wards, his burden would still be heavy enough. The proposition is not a new one; Ludwig is reported to have broached it years ago. Hardly feasible then, because the hospitals possessed in the abject poor too limited a clientèle, the arrangement could now be operated without seriously abridging the experience of the clinician. Hospitals are so freely utilized, even in Germany, that a university professor in a large city can there procure whatever material he requires, and can there perhaps to best advantage discharge his full duty to science, education, and humanity. The alternative, that two chairs be constituted, one devoted to research, the other a willing sacrifice to practice and routine, may be dismissed as inconsistent with the fundamental conception which gives to the German university its unique significance and power.

Fundamentally characteristic of the German professor is his freedom to teach what, and as, he pleases. Obviously, as the clinical teacher is thoroughly a teacher, his freedom in teaching implies that he is the complete master of his clinic on both medical and educational sides. So he is. The technical relationship of hospital to university is indeed decidedly various. But no matter what the legal form, general practitioners and hospital managers stand upon the same platform with the university authorities. All alike reverence science; all are alike zealous to maintain the conditions essential to medical progress. The freedom of the professor in his wards is therefore never imperiled or impaired. He makes such use of his clinical material as his judgment approves; he chooses his own staff; he spends his appropriation on such work as he himself prefers to carry on. The practising profession, so far from seeking to divide or to abridge his power, would strongly resent any effort in either direction,—a condition of affairs that is possible only where local considerations have been eliminated by the selection of a teaching faculty on the basis of scientific eminence alone.

The simplest form of university and hospital relationship exists in Prussia,[1] where both belong to the state.[2] The hospitals are therefore university hospitals, maintained by the state primarily for the purpose of serving the medical faculty of the university. If, for instance, the medical faculty were discontinued, the state would discontinue the hospital, leaving the municipality to deal with the situation as it is dealt with in towns where the state does not support a university. Even in Prussia, however, variation exists: for while the Charité, the main clinical reliance of the University of Berlin, itself stands in a unique relationship to the two departments of war and education,[3] side by side with it exist certain clinics and policlinics which are out-and-out university institutions. Elsewhere in Germany the relationship of the university to its clinical facilities is highly diverse and involved, though, as we shall see, the conditions essential to effective teaching and research are never infringed upon. Not only are non-university hospitals used by the universities, but at times different portions of the hospital, taken as a whole, belong to different organizations. Intelligence and good will enable the several parts to function as one; a single pathological institution serves for all. At Leipzig, for instance, the medical and surgical clinics of the university employ by contract the corresponding wards of a municipal hospital; but the medical and surgical policlinics belong to the university. The women's clinic and the psychiatric clinic belong to the university outright, the pediatric clinic to

[1] The same is true of the single Württemberg university at Tübingen.

[2] It is important to bear in mind that on the Continent all universities are state institutions. In the German Empire the universities belong, however, not to the empire, but to the several constituent states, Prussia, Saxony, Bavaria, Hesse, Baden, etc. Where the state — for example, Prussia — maintains both the university and the hospital, the latter is practically a university hospital; but if, while the state maintains the university, a city or an endowment supports the hospital, some form of contract is employed to define the relations between them.

[3] Originally, the Charité was designed for the special training of military surgeons, though in consequence of its subsequent connection with the university, its students are now mainly civilians. The military still retains an advantage, since all the house appointments are reserved for them and one of the two administrators is a military surgeon. A complete account of the growth of the Charité, its teaching development and administration, is to be found in *Charité-Annalen*, vol. xxxiv; a briefer account in *Medizinische Anstalten auf dem Gebiete der Volksgesundheitspflege in Preussen*, pp. 318-373 (Jena, 1907).

an association; the eye clinic rests on an endowment administered by the university. Munich is almost as diverse as Leipzig: the city has turned over to the university certain wards in the municipal hospital for the teaching of internal medicine and surgery; the psychiatric and the women's clinics belong to the university; the children's clinic belongs to an association aided by the state; all the policlinics are combined in the new and handsome Reisingerianum, which began with an endowment but has now been taken over by the state. Yet, educationally, these diverse units pull together and physically form one plant compactly placed, with the scientific institutes adjoining. At Würzburg, an extremely delicate situation has been handled for a century without sacrifice of educational principle. The hospital and the university were founded by Bishop Julius Echter of Mespelbrunn in the sixteenth century. They remained together under clerical control until the university was secularized in Napoleon's time. Since then, the cleavage in Bavarian politics and society has taken place on religious lines; but the universities have been the stronghold of the anti-clerical liberals. The two parties do not like each other. But general incompatibility has led to no violation of essential educational conditions as between the clerical hospital and a medical faculty anti-clerical in its views. The necessity for more space and more modern equipment, however, has led the state to erect separate university clinics for gynecology and obstetrics, and psychiatry; but medicine, surgery, and dermatology are still taught in the Juliusspital. The university designates its professors in these branches, who become in virtue of that appointment heads of the respective clinics. The staff salaried by the university has unconditioned control of the wards; the endowment meets all ordinary hospital expenses. As the hospital, while still capable of serving a philanthropic purpose, has long been educationally inadequate, the state purposes shortly to build its own clinics for medicine and surgery. But coöperation would probably have continued indefinitely had the ancient cloister lent itself to modern needs.

The German Empire may furnish us one more example of a complicated hospital relationship smoothly serving university needs. The medical faculty of the University of Elsass-Lothringen at Strassburg was, on its reorganization following the Franco-Prussian War, domiciled in the mediaeval Bürgerspital, a richly endowed institution administered by the municipality.[1] In consequence of rebuilding, made necessary by the antiquated character of the old hospital, a highly involved situation has come about: a superb new children's clinic has been built by the endowment, but is conducted by the university; other new clinics and the policlinics have been built by the university on ground belonging in part to the hospital; finally, in the endowed hospital itself certain clinics have been unreservedly turned over to the university, the others being conducted by the municipality. Wherever the university is interested, it has both medically and educationally independent and complete power. Nevertheless, in everything that pertains to the executive and business management, all the clinics melt into one, just as, geographically, they and the labora-

[1] The *Verwaltungsrat* is chosen by the *Gemeinderat*.

tories are one. In this technically intricate situation the simplest rules suffice to avoid friction and to promote effectual coöperation. They run as follows: "The service falls into two definitely separate divisions: 1. The university clinics; 2. The non-university clinics. The university clinics are conducted by the professors[1] of the faculty of medicine; the physicians to the non-university divisions are selected by the administrative board. In the university clinics the university authorities select the assistants; the administrative board selects the assistants in the non-university divisions."[2]

Conditions in Vienna are strikingly similar to those in Strassburg. The great Allgemeines Krankenhaus is supported by a consolidated endowment fund administered and supplemented by the state.[3] Like the Bürgerspital of Strassburg, it contains both university and non-university divisions: of the seven medical services, three are assigned to the university; the other four are retained by the hospital administrators. The local profession not only gladly permits the university to enjoy its allotted divisions, filling the posts in them in its own way, but makes no objection when imported university professors are simultaneously made the heads of non-university divisions. Vienna practitioners, in other words, make no effort to capture what might be regarded as their remainder. Thus, the university professors of dermatology and psychiatry occupy assigned services in virtue of their professorships; but the hospital administration has turned over to them also non-university wards. As they are equally supreme in both, they can, of course, use both for teaching. The main difference lies here: in the university wards, the professor designates his own assistants and gets a subvention from the state for laboratories; in the non-university wards, the assistants are designated by the administration and the head gets a smaller appropriation from the administration for laboratory work. Moreover, there is so general a disposition to increase the teaching facilities of the university that in appointing physicians and surgeons for non-university divisions, the authorities usually select university docents or extraordinary professors, who thereupon at once offer instruction which the university of course recognizes. Thus, practically the entire hospital is the scene of university teaching, though of strict right the facilities of the university are limited to a few specified services.

One more Austrian example will suffice to show how a hospital situation far from simple in form is made to answer academic ends. Let us take Graz, where the university is a state, the hospital a provincial, institution. The province of Styria lets its provincial hospital at Graz to the Austrian state for the clinical teaching of the

[1] This title means always full professor, the so-called *Ordinarius.* It happens both here and at Vienna that not infrequently the non-university divisions are headed by physicians who hold subordinate university posts, for example, *Extraordinarius* (associate professor) or *Docent.* Such appointments are made by the administration and do not in any sense belong to the university; but the appointee is free to give clinical instruction in the wards. Thus a university instructor holding simultaneously a non-university hospital appointment gives by means of it recognized university courses.

[2] *Satzungen für das Bürgerspital,* vol. ii, pp. 15, 17, 18 (Strassburg, 1904).

[3] A recent proposition to turn the administration of the fund over to the provincial authorities has been successfully resisted by the university.

university medical faculty. In this hospital, the services are once more divided into university and non-university divisions. In internal medicine, twenty beds form the university, eighty beds the non-university, division. The university designates the chief of the university division, bringing him in from wherever it pleases. One would expect the province to appoint a chief of the non-university division from the local medical profession. Not so. Without the least objection from the local profession, the province regularly confers the non-university division upon the professor selected by the state for the university division. The entire service of one hundred beds is therefore available for university teaching and research. As at Vienna, and even more commonly than at Vienna, the Graz professor, as the appointee of both state and province, finds himself between two masters, both of whom let him entirely alone.

Indubitably, the Prussian system is the simplest. Other things being equal, both parties prefer it. But its superiority is not so pronounced as to constitute any serious objection to coöperation between the state and other agencies. The financial burden involved in the Prussian plan is resented by the educational department, which has different—purely educational—uses for all available funds. On the other hand, hospital support is fairly to be reckoned a municipal responsibility, as much so as repairing the streets. To let each city bear the burden resulting from unavoidable wear and tear, human and other, seems at once the most economical and the most equitable way of meeting such obligations. So far, there is therefore no sound reason why the Prussian state should assist in caring for the sick poor of Breslau and not the sick poor of Cassel. Does the use of a hospital for teaching purposes import into the situation complications enough to invalidate this position? Certainly not. In the conglomerate hospitals of Munich and Leipzig, either party might indeed make the arrangement intolerable; neither party has ever done so. Trifling irritation does indeed occasionally arise: the municipality is inclined to stint appropriations for laboratory work, for a more varied diet, for more abundant supplies, for building alterations. The university makes subventions designed to cover precisely these items; for where teaching and research go on, laboratories are more expensive, diet more elaborate, bandages more freely consumed, and building additions more often required. The question arises as to just where teaching and research begin to raise normal cost. The university pays, of course; but the municipal administrator thinks it pays too little, the minister of education thinks it pays too much. As a matter of fact, both parties gain: the city obtains for the hospital superior medical care without much expense; the state obtains clinical facilities for the university very cheaply. Occasionally, friction has arisen on questions of dignity: the German professor bears himself in a lordly fashion; the city official may at times regret the power he has parted with, as, for example, at Munich, where the city pays the salaries of certain assistants, while the university professor chooses them. At Leipzig, it is recalled that a professor once arranged to take four assistants with him on a four days' scientific excursion. The local magistracy objected on the ground that the working capacity of the hospital would be impaired. By way of compromise, three assistants went for three days. Friction at least as serious might arise in a hospital owned and controlled by the university. The relations between the department of pathology and the medical or surgical clinic, even if both were university departments, might any day be equally strained. We are too apt to impute blame to external conditions when human nature itself is really responsible. Friction arises indeed; but it arises anyway. No human relation involving two or more persons is wholly immune. Where the university professor teaches in a municipal hospital, he encounters an occasional lack of intelligence in city officials; where he teaches in a state hospital, he encounters a similar lack in somebody else; not impossibly some one might even encounter it in him. In neither case is the situation inherently unworkable. The slight adjustments made necessary by the complicated relationships here set forth are a small price to pay for the advantages both parties enjoy. It is simply a question of good sense. On the whole, all these various arrangements work in Germany because all parties show good sense; and where in other countries similar arrangements are held to be inoperable, it is for lack of good sense. I am not exaggerating the sound judgment that the Germans show in this whole matter. Nowhere has there ever been manifested the slightest danger of interference with the conditions necessary to effective teaching and research, namely, with the appointment of professors by the university and with the professor's organization and management of his clinic; nor have professors accepted calls just to get out of a municipal clinic into an out-and-out university clinic. Müller refuses to abandon Munich for Berlin, though he would thus exchange a city for a state hospital; Strümpell leaves Breslau — a university hospital — to go to Vienna, where his clinic was only an assigned division in an institution supported by endowment managed by the state, and a year later accepts a call to Leipzig, where he will be domiciled in a municipal hospital: in three successive posts, in three hospitals of different character, he experiences, as far as his professorial privileges and functions go, no essential alteration of environment.

The truth is, that the diversity above described is superficial only. Below the surface, all these hospitals are identical in principle. Administrative responsibility and medical responsibility are absolutely sundered. What difference can it make whether the hospital belongs to the state, or to the municipality, or to an association, if in all alike a sharp line is drawn between executive and professional function? If the university (state) hospital confused these two essentially distinct functions, the university professor would find his lot intolerable; on the other hand, the moment the line is drawn in a hospital merely affiliated with the university, it becomes readily and effectually available for educational purposes.

Functional organization is thus the secret of German success in this matter. The German hospital has no medical superintendent. It chances that at Vienna the administrator is a physician; but his business is purely administrative, none the less. His medical training may enable him the better to understand certain problems, but he scrupulously avoids presuming upon it to interfere with the medical or surgical management of the wards.[1] At the Charité (Berlin), the "medical director"[2] appears to be found, but the title is a misnomer. There, as elsewhere, medical and administrative sides are totally distinct, and neither party would have it otherwise. So consistently is this division held to, that a suit for malpractice would lie against the physician in charge personally; the hospital as such could not be involved. Two coordinate administrators keep house. They look after buildings, kitchen, repairs; they engage the help and distribute the nurses. Control is exercised through a number of inspectors, who, without any very specific instructions, are expected to see to it that the housekeeping is "ship-shape." Daily they meet in the offices of the "Direktion" to report on the physical state of the vast institution.

Similarly supreme in all that concerns medical and laboratory conduct is the chief of the clinic. He is absolute master in so far as concerns the selection of assistants, the admission of volunteers and students, the management of the laboratory, the carrying out of treatment. He receives, for example, a laboratory appropriation: he spends it as he pleases. Neither side—administrative or medical—reports to the other; both are subordinate to the central authority. As every possible duty belongs to either one or the other, nothing drops between them. Each is happily free of the other's business. This principle holds universally. The clerical administrators at Würzburg, the provincial administrators at Graz, hamper the clinical professor who is a guest in their wards as little as the civil administrator at Breslau hampers the professor who enters the hospital of legal right. The main difference lies here: the professor who works in a university hospital gets his whole budget from a single source; the professor who utilizes a municipal clinic derives his budget from two sources, pooling both sums when once he obtains them. But negotiation with two contributing parties is somewhat tedious. Is a desired piece of apparatus properly a charge upon the town or upon the university? If upon both, in what proportions? Are both able at the moment to pay their respective shares? If not, shall the impecuniosity of the one wholly excuse or more heavily burden the other? Is expenditure on a proposed piece of work chargeable to education or to hospital routine? One must not close one's eyes to such perplexities. Nor, on the other hand, must they be allowed to loom too large; for the professor who has to deal with only one party also encounters delay and compromise in consequence of the ministerial obligation to reconcile conflicting claims upon resources that can in no event be adequate to satisfy all.

The exact form which hospital administration takes is therefore relatively unimportant. When professors attend to their duties, and when the distinction between executive and medical control is observed, administration may take what form it will without detriment to educational interest. Huge hospitals like the Charité at Berlin, the Allgemeines Krankenhaus at Vienna, the Bürgerspital at Strassburg, possess a

[1] The same thing happens at Guy's (London), see page 199.

[2] Der aerztliche Direktor.

highly centralized administration: one or two officials wield supreme executive control. The much smaller clinics at Marburg are, administratively considered, separate entities. The professor is there nominally the administrator, the executive duties being turned over by him to a business representative. At Greifswald, some clinics are conducted on the Marburg plan; in other cases, two or more clinics are combined under one administrator. Breslau has one kitchen for the entire institution, except psychiatry, Marburg a separate kitchen for each clinic. It all comes to the same thing in the end. Discuss as we will the respective advantages of one form of administration over another in reference to economy or simplicity, the conclusion is educationally of no material consequence, if a fundamentally sound differentiation has left educational and scientific management where, from the start, it properly belongs.

Successful operation of the arrangement described is conditioned simply on attention to duty. The hospital administrator, whatever he be called, is forced and habituated to intervene if hospital physicians are irregular or otherwise neglectful in attendance; nurses assume enlarged responsibilities where the resident staff is composed of inexperienced transients. We shall see this again in England, where the same theory as to management prevails as in Germany. The executive end is at times over-heavily burdened because some members of the unpaid visiting staff sacrifice hospital duties to practice engagements; unquestionably, too, English nursing, far superior to anything to be found on the Continent, is tempted to transcend its proper sphere because of the absence of a seasoned resident medical staff, analogous to the German assistants. The payment of the German hospital physician,—university or other,—the existence of the stable, salaried staff, render the theory on which duties are differentiated as between executives and physicians a readily workable one.

With complete medical control within the wards goes control over the admission of material. Having decided that universities properly supported by the state and possessing traditions and ideals deserve opportunities to teach and to investigate, the authorities go one step further: they give them the pick of the material in order that nothing valuable may be lost to them. At Strassburg, for example, there are two medical divisions, one a university, one a non-university, service; the same is true of surgery. The admitting office is in charge of two physicians; but in order that education may get the preference, these admitting officers are designated by the university, and have the right to send into the teaching wards all the interesting and valuable cases.[1] At Vienna, an equally intelligent policy prevails. Two receiving officers are on duty day and night: one represents the university divisions, the other the non-university divisions. The university representative has first choice. If he rejects the case, the non-university representative must accept it if there is space.

Finally, one more concession, already touched on: the wards given to the university

[1] The sole possible exception is in case of a patient sent to the hospital by a physician outside with an express request that he be turned over to a particular service.

become the teaching home of the full professor, or *ordinarius*. Meanwhile, the university appoints associate professors (*extraordinarii*) and docents with leave to teach, though facilities do not, as a rule, go with the appointments. They offer such lectures and courses as they please, fixing and retaining the fees. In clinical subjects these instructors can do little unless they get access to material. They procure it in various ways; at times by becoming assistants to the full professor and using his material by courtesy,—an easy matter when a professor has a clinic of several hundred beds and a policlinic besides; occasionally, they start private clinics and policlinics. But very frequently, the *extraordinarius* or the docent is appointed by the city to be chief of a non-university division; and though the city designates and pays his assistants, it makes no objection to his using the material for teaching. Hence the non-university wards of the great public or endowed hospitals of Vienna and Strassburg are virtually parts of the educational resources of the university.[1]

In respect to location, the clinics used by a medical school, while possessing their own special laboratories, belong in close proximity to the general laboratories. This point has already been developed in our discussion of the laboratory branches. The medical school is a single plant, characterized by the mutual suggestiveness and helpfulness of its various parts. The orderly progress of medicine is in the first place conditioned upon the formulation of problems, originating indifferently on the clinical or the laboratory side. A problem may spring from a case, a group of cases, a theoretical observation of chemical or biological character, from the suspected therapeutic efficacy of some agent contrived in the laboratories, or in any one of a dozen other ways. Knowledge of a clinical condition is complete only when it embraces functional, chemical, physical, and morphological sides. Thoroughly to understand the phenomena of disease, then, transit to and fro between the bedside and the fundamental laboratories must be unobstructed. Distance is hardly less formidable an obstruction than absence of interest or of sympathy. For it not only stops the give-and-take, but it forbids that casual intercourse between men working at different points, but with common ultimate objects, which is so effective a stimulus. A word, a hazarded guess, may in just such informal intercourse prove the seed dropped on receptive soil. The immediate proximity of the rest of the university is a matter of less importance. For the unity of the whole is ideal, rather than practical. Ideals unite the department of medicine with those of letters and science, once the department of medicine is itself an organic whole.

The German universities have not thus far deviated from sound principle in this matter, except as mere size of plant and number of students have tended to make intercommunication difficult. Otherwise, hospitals and laboratories form a compact geographical whole. The kernel of the clinical end of the university at Berlin is the

[1] At Graz, only one division is at present not headed by a university teacher. It happens, too, at the moment that the director of the hospital is a university docent; his predecessor was not. He is, of course, as director, responsible to the province of Styria. His university docentship is an entirely independent affair.

Charité; the laboratories of anatomy, physiology, pharmacology, and chemistry are in the immediate vicinity,—as close as the exigencies of university building in the heart of a great city permit. The more recently added subsidiary clinics are unfortunately somewhat removed,—a disadvantage that is greatly deplored. At Vienna, the Allgemeines Krankenhaus forms the core; the laboratories are all within a few minutes' walk. That of experimental pathology and sero-therapy is hardly more than five minutes' distance: yet already it suffers from detachment. Workers there miss the stimulus of the sick-bed to which experimental pathologists more fortunately situated have easy recourse,—Hering at Prague, and Sir Almroth Wright at St. Mary's (London), for example. The very minuteness to which our intense specialization tends requires indeed to be combated by geographical integration of the school plant. However profitable it may be to carry on pure researches in experimental pathology or pharmacology, the clinic is needed, ever and anon, to bring results to bear. The interaction between pure science and practical application, whether casual or intentional, produces a situation in which problems spring up readily and sane standards of value prevail.

In the smaller universities there is less danger on this score. Space is more easily procured; and departments are both fewer and less extensive. The reconstruction of the antiquated plants of these schools has, as a rule, proceeded with the express design of bringing everything together finally on a new site. For instance, the rebuilding of the medical clinics and laboratories of Giessen began in 1889, and has gone ahead since as the little state of Hessen has been able to contrive the means. The clinics have now all been rebuilt; of the laboratories, pathology and hygiene have been provided, anatomy is close by, pharmacology is under way; only physiology remains to be transferred.

An exception threatens. The hospital at Graz and the laboratory institutes have been heretofore in easy reach of one another. But a site some twenty minutes distant has recently been acquired, on which it is proposed to construct a modern hospital. The laboratory men view the step with dismay. In the past it has happened that two men —a pharmacologist and a clinician—have together attacked a problem. Unless the laboratories—unfortunately themselves too good to throw away—are removed, such scientific connection will be snapped.

The natural home of a medical school is obviously a large city; there abundant and varied clinical material exists at hand; thither rare and obscure cases may be easily transported. The German universities, however, grew up in days when the teaching of medicine consisted of theoretical exposition rather than actual confrontation. It was as easy to expound Hippocrates in a village as in a metropolis. But things have changed, and meanwhile the surviving universities remain, with one exception,[1] where they were. To some extent, the rapid growth of towns has cured the difficulty.

[1] The Ludwig Maximilians Universität was transferred from Ingolstadt to Landshut, thence to Munich in 1826.

Between 1871 and 1905, Heidelberg increased in population from 19,983 to 49,527; Bonn, from 26,030 to 81,996; Kiel, from 31,764 to 163,772; Freiburg, from 26,440 to 74,098. But towns like Greifswald (population 23,767 in 1905), Göttingen (34,081), Marburg (20,136), Giessen (28,769), Tübingen (16,809), are obviously incapable of furnishing sick people enough. The details of the mechanism by which this natural defect has been remedied by a financial device that adds the resources of the province to those of the town will be more fully explained when we come to deal with the financial aspect of medical education.[1] Suffice it here to say that the fame of the professor, the forethought and liberality of the state, have been the important factors in building up clinics aggregating 881 beds at Tübingen, 458 beds at Göttingen, 478 at Greifswald, 664 at Marburg,—and this despite the proximity of the universities named to each other and to large towns like Frankfort a. M. or Berlin; for Marburg is less than twenty miles from Giessen, and Giessen just forty miles from Frankfort.

Greifswald may serve as typical of the small town university clinic. Its situation appears highly unfavorable, for it lies in a thinly settled agricultural region. There are no factories in or near the town; immigration has consistently avoided it. Stralsund, Stettin, and Berlin itself, all with excellent municipal hospitals, are in the vicinity. The sick poor nevertheless go in sufficient numbers to Greifswald because, in the first place, as we shall later see, it actually pays to do so, and because, in the second, the fame of the professor is a powerful magnet. The peasant does not know the details; he does not know that the Greifswald surgeon has just refused a call to Tübingen, or that the chief of the medical clinic has just come from Berlin, where for years he has been first assistant to Kraus; but the dullest rustic has long since grasped the fact that the professor is chosen for his skill and learning. The size of the town and the size of the university do not therefore affect the type of institution at all. The clinics of Greifswald are in form, organization, content, and conduct essentially the same as those of Leipzig and Berlin, even though internal differentiation may not be carried quite so far.

The clinic is everywhere fed and supplemented by the policlinic—or out-patient department—attached to it. The professor is in simultaneous charge of both; even though in large towns the actual care of the policlinics is delegated to his assistants, his beds are replenished from the ambulant cases, which are also utilized for his lectures. In Berlin, Munich, and Leipzig, the amount of material available is thus enormously increased. Surprising is the showing made by the smaller towns. At Tübingen, the smallest of all, 7000 patients annually attend the medical policlinic; some 3000 more are looked after at their homes by assistants and students. An excellent relation has been established with the physicians of the neighborhood, who frequently refer cases to the university professors.

It is clear, then, that no medical school in Germany exists without a sufficient—

[1] Chapter xii.

we should say, an abundant—supply of clinical material.[1] Where the small towns do not lack, the great cities will surely not suffer. Nor do they. Berlin possesses 1462 beds at the Charité, and 485 in supplementary university clinics, a total of 1947 beds under absolutely complete control;[2] Leipzig,—in point of material relatively the richest of German clinics,—2123;[3] Munich and Vienna are both well provided.

The importance of mere abundance can hardly be overestimated. The undergraduate student, of course, needs in the first place to study typical cases well. He does not at this stage require numbers; but once he has learned types, variety of illustration is necessary in order to drive home the lesson he has just learned, and to differentiate the type he has just mastered from others more or less closely resembling it. To the teacher, mass of material is even more important. For the clinical teacher—being, according to our hypothesis, also a clinical investigator—occupies himself with a specific problem. He needs all the material bearing on it that he can get; and his chances of obtaining it are best where the absolute capacity of the hospital is greatest. A hospital of 250 beds may indeed contain what is immediately necessary

[1] Abundance is not only absolute, but relative; that is, the amount of material is large relative to the number of students. The following table gives the amount of material available in each of three important clinics and the number of students attending at Breslau in each of several years:

	Internal Medicine		*Women's Clinic*		*Pediatrics*	
Years	*Cases*	*Students*	*Cases*	*Students*	*Cases*	*Students*
1901–1902	1805	70	1577	71	210	41
1902–1903	1716	58	1577	43	262	25
1903–1904	1703	61	1547	60	245	26
1904–1905	1801	42	1539	47	248	20
1905–1906	1696	38	1605	27	262	19
1906–1907	1750	46	1638	44	280	24
1907–1908	1588	46	1824		344	32
1908–1909	1523	44	1845		340	29

In the following table I have coupled the total number of beds and total average attendance in the summer and winter semesters of 1905–1906:

Place	*Beds*	*Students*
Berlin	1947	991
Bonn	1217 (640 *in Insane Asylum*)	196
Göttingen	458	171
Halle	613	144
Kiel	582	236
Königsberg	484	175
Tübingen	881	163
Giessen	608	148
Heidelberg	856	250

The number of patients who object to being used for teaching is not seriously large: out of 2750 medical cases at Tübingen (1910), 2400 were usable. Professor Friedrich von Müller, testifying before the Royal Commission on University Education in London, estimates one-tenth as not usable. (*Appendix to Third Report of the Commission*, p. 319, London, 1911.)

[2] This does not include private clinics and policlinics belonging to instructors and used in teaching.

[3] The details are interesting.

Internal medicine		800 beds
Surgery		411 beds
Women's clinic		155 beds
Psychiatry		160 beds
Eye		100 beds
Children		254 beds
Dermatology		208 beds
Ear, Nose, and Throat		35 beds
	Total	2123 beds

for the fundamental instruction of a small undergraduate class: it is less likely to contain much material germane to the obscure problems selected for study by clinician or surgeon. According to the doctrine of probabilities, a hospital of 1000 beds, freely open to all comers, is far more likely to furnish what is interesting or rare, and in the necessary abundance.

As respects amount of available material, the German university is even stronger than the foregoing statements indicate. For the clinical resources of all are practically pooled for the benefit of the entire student body. The German student migrates freely. A local defect need, therefore, cost him nothing. What of it, if Giessen has no children's clinic at this moment? The student will spend a semester at some university that has. What of it, if internist or surgeon be slightly antiquated? Pending a change in the chair, students get medicine and surgery somewhere else. Doubtful as to whether a large or a small school is better, the student escapes the dilemma by attending both. Every German student can thus piece together for himself a clinical experience in which, so far as quantity of material or quality of teaching is concerned, there is absolutely no defect whatsoever.

I have said that the German hospital is a functional organization, the ultimate units of which are the several clinics and the pathological laboratory common to them. Of these separate clinics there are always at least five, each usually with its own pavilion: internal medicine, surgery, psychiatry, obstetrics and gynecology (combined as the "women's clinic"), and ophthalmology. This is what one finds at Göttingen, Königsberg, and Marburg. A distinct tendency is observable in the direction of providing separate clinics for dermatology, pediatrics, and even other branches. They already exist in large centres like Berlin, Vienna, Munich, Strassburg, and Breslau; and are found here and there in smaller places. Bonn has, for example, its separate dermatological clinic of 90 beds, Greifswald its children's clinic of 30, Halle an ear clinic of 25, Tübingen an ear clinic of 10. In general, there is only one clinic in each department; but in large cities, medicine, surgery, and occasionally the women's clinic are divided: at the Charité, for instance, there are two services in internal medicine, two also at Munich, three at Vienna.[1] Even so, the number of beds is not infrequently excessively great. In case a second clinic is established, the entire organization and equipment are repeated. The two share nothing: each clinic has its own staff, its own laboratories, its own policlinic. Each is as complete as if there were no other.

The scope of the several clinics is for the most part self-evident. Worthy of special comment only are the women's and the psychiatric clinics. The women's clinic combines obstetrical and gynecological wards. Separation into two specialties tends to make a midwife of the obstetrician and an abdominal surgeon of the gynecologist, to the neglect of the fundamental pathological and physiological problems in both cases. Consolidation avoids the necessity of drawing arbitrary lines by way of making two specialties where nature has made but one: for obstetrics and gynecology

[1] Not counting the non-university divisions.

have a single physiological and anatomical point of departure, —namely, the child-bearing function.

The psychiatric clinic has been differentiated out of the insane asylum, previously utilized for such instruction in mental diseases as was in vogue. The insane asylum makes a poor clinic: thither come, only after delays due to legal formalities or domestic sensitiveness, chronic cases that have already passed through many phases. The psychiatric clinic, on the other hand, in conduct, appearance, and location simply one clinic among many, now receives these patients at a time when they may still be medically helped and while they are educationally and scientifically most suggestive. There is, besides, a large class of patients — hysterics, alcoholics, etc. — for whom no proper hospital facilities existed prior to the creation of the psychiatric clinic. In general, psychiatric patients need to be retained for relatively short periods. A clinic of 100 beds may therefore accommodate something like 2000 cases in the course of a year.

The objects which the German clinic is designed to subserve are three: healing, teaching, and research. Its equipment, organization, and conduct are throughout mindful of its threefold purpose. In general, each clinic has its own building, containing wards, lecture hall, examining, demonstration, and preparation rooms, museum, laboratories appropriate to its function, — all under a chief, who has a staff made up of paid assistants not engaging in practice, part-time assistants, volunteers, nurses, and helpers. By way of illustration, let us describe one of the new medical clinics of the Charité (Berlin).

The clinic as a whole comprises six precisely similar "stations," each "station" with 28 beds, made up as follows: a central ward containing 18 beds; small rooms adjoining containing together 10 beds; a convalescing room; an examination room, bath, diet kitchen, quarters for nurses, etc., and finally a clinical laboratory fully equipped for routine examination of blood, urine, sputum, etc. The immaculate appearance of these little laboratories is ascribable not to lack of work, — an immense amount of material is daily handled in them, — but to a system of fines for offenses against good housekeeping: a penalty of two cents is imposed if a gas-jet is left burning, one of ten cents if a lens is left lying about. In consequence, no worker loses any time disposing of litter left by another.

To each clinic as a whole belongs a set of research laboratories, varying with the character of the clinic and the particular problems in which the staff is at the moment interested. Appropriate to the medical clinic are laboratories in which chemical and biological methods may be applied to clinical problems, — thus supplementing observation of symptoms and statistical study by direct experiment. Surgery has its laboratories of pathology and experimental physiology. Animals for experimental purposes are always provided; for with his sure scientific instinct, the German has realized that one must experiment in any event, and that one avoids experimenting with man in precisely the measure that one can experiment with animals. The women's clinic is equipped with laboratories of pathology, embryology, and chemistry. Psychiatry is fitted out for psychological, anatomical, and histological studies. Kraepelin's new clinic at Munich contains appliances for measuring perception, retention, reaction time, and the ability to perform mental work; apparatus for recording involuntary and reflex movements, for the investigation of the influence of mental processes on the pupil, respiration, heart-beat, blood pressure; a sound-proof room, where extraneous sensory stimuli may be excluded; a sleeping-room, where the depth of sleep may be studied in the effort to understand the physiology, pathology, and hygiene of sleep. Photographic rooms, Roentgen ray apparatus, and a collection of pathological specimens are practically invariable features of each clinic. Hydrotherapeutic apparatus, electric, colored-light, and other baths, douches, a pneumatic chamber, Swedish movement gymnasium, and similar equipment are commonly found.

The above description applies generally to the equipment of all German clinics, be they in small places or in large. The medical clinic at Greifswald, to take a small university, contains a lecture room equipped with epidiascope for the projection of cuts, slides, and illustrations, an apparatus for displaying Roentgen photographs, a set of reagents for making essential clinical determinations on the spot, a long table for microscopes, on which at the close of the lecture students may examine the slides prepared or demonstrated; research laboratories of chemistry and bacteriology are provided for assistants, who are selected because of their fitness to work in one or the other direction; a gymnasium, an electric bath, an excellent library in receipt of all important journals, a room for undergraduate instruction in clinical microscopy,—these are all features of the medical clinic in a remote Pomeranian village. Even where, as at Munich, Vienna, Graz, or Würzburg, antiquated buildings still house the clinic, space has somewhere and somehow been contrived for laboratories. At Vienna, for instance, they have been squeezed into the old clinical building; space has also been won for laboratories in the wooden sheds erected in the hospital courts for ambulant patients. At Würzburg and Graz, the necessary rooms have been made in out-of-the-way corners in the ancient cloisters utilized as hospitals. Meanwhile, thanks to the vitalizing influence of science, new clinics, which will concentrate and economize effort, are in almost all these universities either in process of erection or planned for the near future; for, though scientific work can indeed be done in a hovel or a cellar, comfortable quarters and adequate equipment effect immense economies.

The staff of the clinic consists of the professor, assistants, and volunteers. At Berlin, there are eight assistants in the second clinic above described, three of whom live in the house. The assistants divide the "stations" and the laboratories between them; so that, while the entire body of assistants follows the chief on his rounds, responsibility for the current oversight of the different wards and for special laboratories always falls to a particular assistant. A designated individual is responsible and all get benefit. The clinic and the laboratories belonging to it thus form a tight organization: for the laboratory heads also being assistants are each, as a rule, in charge of a "station." The professor himself, while directing the entire clinic, usually acts as chief of one of the laboratories. Müller at Munich, for instance, is in immediate charge of the chemical division, while assistants are, under his supervision, in charge of bacteriological and other divisions; questions falling outside the laboratories immediately connected with the clinic are referred to the appropriate institute. To the staff of the clinic one must also reckon "volunteer" assistants, who flock to the more prominent clinicians, by whom they are hospitably received, being allowed easy access to the wards and laboratories.

This type of organization is universal. Müller's clinic of 400 beds at Munich is divided into units averaging 50 beds apiece, each in charge of an assistant, aided by a *Praktikant*—a non-resident interne of vague status[1]—and one or more volunteers. The medical clinics at Vienna contain 100 beds each, with four to seven assistants, and the usual number of volunteers; 200 beds form the medical clinic at Tübingen, in handling which the professor is assisted by a staff of seven, not reckoning volunteers;[2] at Heidelberg, a professor and twelve assistants form the medical staff.[3] On the surgical side similar arrangements hold: the professor at Heidelberg has an organized staff of 13; at Greifswald, one of 6. The smallness of the staff gives its members remarkable opportunities; but it tends also to require them to spend much time in doing or overseeing mere routine. What is valuable to the assistants and to the patients in this abundance of opportunity probably would not be diminished if the students, while serving their practical year, were made more responsible parts of the hospital machine. I shall have occasion to point out shortly that the practical year is well-nigh universally regarded as a disappointment, precisely because no definite duties have been attached to it. If, now, the *Praktikant* occupied a definite place in hospital economy, the educational value of the experience would be greatly increased; the needs felt in the effort to realize the full value of the experience would react favorably on the conduct of medical education; the routine care of the patients would probably be improved; and the assistant, instead of finding his actual opportunities reduced, would obtain more time for the prosecution of important activities.

On the side of organization, the assistant is the most important link in the chain, and this chain, at least, is as strong as its strongest link. What the assistant is, the professor was; what the professor is, the assistant hopes some day to become. The assistants are the men in training for high clinical posts, and their training shapes their clinical careers. Dissimilar in details though all these careers be, in principle they are alike. The German clinician has a point of view that goes back to an intensive discipline in one or more of the underlying sciences. A generation or two ago, this discipline was pathological; nowadays, it is more apt to be chemical or biological, and no perfunctory training in chemistry or physiology at that. The prospective

[1] See below, p. 178.

[2] The entire force numbers from 55 to 60 persons, of whom 19 are nurses, 2 orderlies.

[3] The entire force numbers 63, of whom 30 are nurses.

clinician pauses in one of the fundamental branches long enough to achieve some genuine distinction: he will frequently have turned out a substantial piece of work in chemistry, physiology, or pharmacology before, as volunteer or assistant, he attaches himself to the retinue of a distinguished clinician. Opportunities in one or the other capacity abound, for the doors of the German clinic swing open readily to any trained man who wants to work. There is place for him at a table in one of the research laboratories; he obtains readily from the wards such material as he wants. The chief will talk with him about his problem, perhaps assign to him some aspect of the larger task upon which the combined forces of the clinic bear. The staff thus works like a team, with an organization at once loose and sympathetic, allowing every worker his independence, insuring him at the same time a definite function in a planned organic scheme. The volunteer is expected to remain a reasonable time — six months, perhaps; he is welcome to stay longer if he makes good; if not, he is let alone, and soon moves on, unnoticed. As a rule, the assistants are recruited out of the ranks of the volunteers. Local considerations have nothing to do with appointments or promotions. It matters not in the least where one lived, studied, or was graduated. Anybody can get into a clinic anywhere, just as he can go into a laboratory of physics or a seminary for Greek, the sole question being competency. The volunteers form, then, a sort of nursery from which the assistants of lower rank are apt to be selected. Thenceforth promotion depends altogether on performance. The line is continually broken; it zigzags from place to place. The assistants' posts carry small salaries and the privilege of living in the clinic. The income may be augmented by fees received for conducting optional courses in clinical microscopy and physical diagnosis.[1] On these terms the assistants serve long periods with marvelous enthusiasm and devotion, at times following their chief wherever he is called. Of the Berlin assistants, one has served with his chief seven years, two (one of them a woman), five; at Breslau, there are surgical assistants who have also seen seven years of service; in one of the medical clinics at Vienna, the longest term is twelve years, the shortest, six.[2] The stable character of the staff has many consequences; in the first place, it makes it possible to open the clinic freely to others. The official staff is not adequate to look after the number of patients a clinic ordinarily contains; and thus far it has not been supplemented by resident internes. The well-nigh continuous presence of four or five assistants in a service of one hundred beds renders feasible the admission of eight or ten volunteers, without danger to the orderly conduct of the laboratories or proper care of the patients.

[1] In recent years an unfortunate tendency has developed: more of the assistants live out of the clinic and engage in practice.

[2] The training of the German assistant is illustrated in the following typical careers:

Munich, second medical clinic. First assistant: two years, assistant pathological anatomy, Zürich; one year, voluntary assistant, medical clinic, Basel; clinical assistant at Munich since 1902; scientific work on pathology of diseases of blood, metabolism, nephritis.

Second assistant: one year assistant in chemistry, Prag; two years assistant in pharmacology, Prag; one year voluntary assistant, medical clinic, Basel; assistant physiologist, Munich, since 1902; for the last three years, director of research laboratories; scientific work on diseases of metabolism.

But of far greater importance is this consideration: the stability of the German clinic establishes schools which introduce continuity into medical development. The present race of internists were the pupils of chemists and physiologists, and have themselves trained their own successors, who are simultaneously affected by new lines of investigation. Long association with a chief who has ideas and a point of view creates a band of workers standing for definite conceptions. Scientific progress is achieved in no other way. It begins with the teacher, not with the student,—a teacher of original and inspiring power. It is idle to supply conditions favorable to students unless efficient measures have been taken first to procure the teacher and to provide for him the environment essential to continuous activity. The German clinic answers this description; hence, workers will surmount every obstacle in order to attach themselves to it.[1]

I have said that the German clinic has three functions, healing, research, and teaching. Though our concern is primarily with the last, it is impossible to omit the other two: in the first place, because the question at once arises as to how unrestricted freedom of teaching reacts on the patients; in the second, because the scientific spirit completely dominates every activity that goes on within a German clinic.

The preference of the German peasant or artisan for the university hospital refutes at once the notion that the patients of the professor are to him problems rather than persons. The peasant is right: nowhere does he receive such intelligent or continuous attention as in the university clinic. The professor himself makes daily rounds through the wards, pausing for examination or discussion wherever conditions require. Meanwhile, the assistant, himself a trained and experienced physician, sees every patient in his division on his regular afternoon rounds. One or two volunteers are also apt to take a hand. The X-ray room and the clinical laboratory are continuously invoked for diagnostic aid. There is thus little chance that significant symptoms will escape notice, or that possible therapeutic measures will be neglected. Occasionally it may happen that an interesting patient is somewhat too conscientiously examined, for no member of the retinue likes to have a really unique phenomenon escape him. In general, however, the quantity of material available in the clinics and out-patient departments is so liberal in comparison with the number of assistants and students that the patient is not unnecessarily annoyed.[2]

[1] The German arrangement may at times bear hardly on an individual. When a professor is called and brings several assistants with him by way of transplanting his organization and procuring homogeneity in the teaching of students and the conduct of the clinic, he necessarily displaces the assistants left by his predecessor. The latter go into practice, where, of course, their experience proves of priceless benefit. They may continue to teach, provided they procure the necessary material.

[2] In connection with the utilization of Frankfort's hospitals for the proposed new university, the municipality has investigated this question. The commissioners propose that no patient be used for teaching purposes against his will, as is the custom of Strassburg, Munich, and Leipzig. "On inquiry we ascertain that no difficulty arises on this score, for the patients, even those of the higher classes, are always ready to be thus utilized." (*Bericht des Sonder-Ausschusses*, p. 6.) The suggested arrangement expressly stipulates that "teaching is to be carried on with all possible regard for the welfare of patients," etc. (*Ibid.*, p. 34.)

One hears it asserted none the less that the German hospital patient is, to say the least, unsympathetically handled. I feel certain that the charge is due mainly to misapprehension. The nursing is indeed inferior, for the trained nurse is just beginning to make her way into Germany; her place is still occupied by a somewhat unintelligent and quite unattractive maid, bordering on the ordinary servant type. But the continental laboring man or woman is not offended by her somewhat unceremonious attentions. As for the professor, he is a superior being dealing with social inferiors. Often enough he handles his patients with charming gentleness and kindly humor; but even a brusque or impatient bearing on his part implies no real harshness. The German mistress carries herself thus to her servants; the German employer to his clerks; why not the doctor to his hospital patients? Something must be ascribed, also, to a certain cynicism as respects human life that one encounters in old societies: the lower classes are habituated to hard conditions; the upper take that for granted. General social conditions determine the relation of doctor and patient inside the hospital and out. The supremacy of the professor has nothing to do with it. If the hospital administrator or hospital board were free to control him as they pleased, this is one point in reference to which it would in general occur to no one to suggest a change.

As to research: be a man never so busy with patients, teaching, or what not, no member of a German clinic can do his full duty by faithful attention to routine. Research is in the air. I have already pointed out in dealing with pathology that every medical and surgical clinic is potentially, and almost every one of them actually, a chair of experimental pathology. While the laboratories connected with the clinics are in the first place concerned with clinical problems, they do not hesitate to attack fundamental questions if in the course of an inquiry it develop that the theoretic basis is lacking. Between the laboratories within and the laboratories outside the clinic, the relation is one of helpful, informal coöperation.[1] A certain amount of duplication is inevitable; but on closer scrutiny, even duplication is perceived not to be without specialized differentiation. In any case, the notion that differentiated clinics are narrow is completely upset. The German internist studies and teaches disease not from one standpoint, but from many: the chemistry, pathology, and bacteriology of every condition are thoroughly investigated. It is therefore a misconception to allege that scientifically conducted clinics are narrow, whereas empirically conducted general hospitals are broad. It is urged, too, and with greater reason, that some of the research turned out is of no great value. But it may be asked what percentage of the suggestions that occur to any individual who has a fertile mind are worth toleration and development? Surely, a very small percentage indeed. In order to get an occasional

[1] "But I do not regard it as essential that everything pertaining to the clinic be carried out in its laboratories. Special problems may well be referred to the university institutes for coöperative solution. I hope to cultivate intimate relations between the children's clinic and the theoretical institutes." Inaugural address of Professor v. Pirquet, "Die neue Kinderklinik," November 13, 1911, *Wiener Medizinische Wochenschrift*, No. 47, 1911 (abridged).

idea that is sound or valuable, one must sprout a large crop of ideas. Research is in this way wasteful, irresponsible; it leads continually into blind alleys; its "mines" turn out to be mere "pockets." But the cost is immaterial, once a "strike" is actually made.

The clinic, however, is not only a place where the sick are cared for and scientific research is carried on: there also doctors are trained. The professor of medicine is at once physician, investigator, and instructor. We have briefly discussed him in the first two rôles. Let us describe him at somewhat greater length as teacher.

Proper methods of teaching medicine must be determined by consideration of the subject-matter and the object in view. The student's medical education inducts him into a vocation in which he becomes at once responsible for human life. The medical school is therefore bound to train physicians. Does this mean men who have at their fingers' ends an infinite number of recipes, one or another of which come to mind the moment a given set of symptoms is perceived? Assuredly not. That might conceivably be the correct way to train physicians, if human ills were all thoroughly understood, catalogued, and set down each with its appropriate remedy. As a matter of fact, few abnormal conditions have been as yet worked out to anything like this extent; none completely so: for even such specifics as the anti-diphtheritic serum, quinine, and mercury, cannot be mechanically or unintelligently employed. Every human body has its own idiosyncrasies; no two sets of abnormal conditions are ever precisely the same; no two organisms ever respond in precisely the same way. Milk helps one diabetic and harms the next. It is therefore impossible to develop two types of physician, one to find things out, the other to apply what has been ascertained. For the same kind of intelligence, the same sorts of observation, knowledge, and reasoning power, are needed for the application, as for the discovery, of effective therapeutic procedure.

For this reason, the important point in medical education must be to put the student in possession of scientific method. Knowledge of so-called fact falls short or becomes antiquated and useless; scientific technique lasts and improves. Once the physician knows how to unravel the puzzle that the patient presents, to note and to follow out clues, the mastery of the positive resources of therapeutic art is a comparatively simple matter. "Diagnosis," says Friedrich von Müller, "is the peculiar art of the physician." This does not mean that the physician's interest ceases when he has worked out his problem and given it a name: in a sense, he is then just ready to begin. But correct diagnosis means intelligent control;[1] it means a fight in the open. The ground is firm beneath the doctor's feet. He has still, indeed, his fight to make,—to win the battle or postpone defeat. And one battle, at least, he will sooner or later inevitably lose.

This point we may regard as of the first importance: medical education aims fundamentally at scientific discipline in the art of diagnosis. How is the student to acquire such practical skill? He possesses already the concrete acquaintance with the structure and operation of the normal body which he brings from his studies in

[1] "Qui bene diagnoscit, bene medebitur."

anatomy and physiology. He has dissected the cadaver and learned the topographical relation of its various parts; he knows from experience the size and location of the internal organs in health. Physiology has taught him what is normal in respect to bodily temperature, the condition of the skin and tongue, the composition of urine, blood, etc. All this he knows — not merely knows about. It constitutes, then, his point of departure.

Does not this basis itself suggest how he must acquire his knowledge of the abnormal and its significance? Professor Dewey has very rightly remarked that in education "the initiative lies with the learner." With the picture of the normal in mind, confront him with the abnormal: let him note discrepancies, make his interpretation, and then ascertain by still closer observation and examination whether his interpretation is sustained. To begin by telling him, by pointing out, by calling his attention, is to deprive him of that initiative which is so highly educative. Learning is a game in which the student must move first.

At bottom, then, the "peculiar art of the physician" is the ability to make an inference on the basis of observed and ascertained fact; and the student acquires the art, if at all, by doing the work. The unaided eye, ear, and finger first come into play. The appearance of the skin, the shape and size of members and organs, the "feel" of a region, — here are certain physical signs that make up one part of the picture. The patient's view of his own case provides another set of factors; for every patient is a doctor observing his own case, to the extent of the experienced discomforts that he rehearses in giving the "history" of his trouble. A third set of factors remains to be ascertained through microscopical or other investigation in the clinical laboratory, X-ray photographs, or pulse tracings. Such are the completed data on the basis of which the physician ventures his theory or diagnosis; until he has assembled them, as far as they are relevant, suspense, not decision, is his proper state of mind. Notions occur to him, of course, as he goes along. Instead of adopting one or another, and thus either distorting or bringing to a close the process of impartial objective study, he does precisely the reverse: he entertains a definite suggestion only as a basis for further observation. "If the patient has malaria," — this is one of the suggestions that dart into his mind as he proceeds, — "then," he reflects, "I ought to find this or that condition: is it there?" The entire handling of a case is but a repetition of essentially this process. Logically viewed, treatment is an experiment, the patient's condition from time to time constituting nature's response to the physician's effort. Whether the physician perseveres in his line of action, modifies it, or beats a retreat depends upon the character of this response.

Whether the student is well or ill trained is determined accordingly (1) by his ability to extract from the patient by cross-examination a coherent account of himself and the conditions he complains of; (2) by his skill in observing with aided or unaided eye, ear, and finger anatomical and physiological abnormalities; (3) by his capacity to detect irregularities in urine, blood, sputum, etc.; (4) by his facility in putting together all these facts and drawing from them a conclusion as to their meaning in combination. This is diagnosis—"die eigentliche Kunst des Arztes."

Upon this basis he begins next to learn therapeutics, whereupon repeated observation of the progress of the patient must in the same way by actual experience test the thoroughness of his observation, the soundness of his inference, and the value of the expedients employed. In the end, a well man goes out of the hospital door, or the autopsy illuminates what remained dark and problematical.

The best of medical schools will not, of course, make expert doctors: only long and varied experience ever does that. But the medical school must start the youth along right lines; train him to know and to use his tools, give him sound conceptions, methods, and ideas. For the most part, these acquisitions depend either upon doing, or upon participation in doing, under competent oversight and control; nor are they acquired even by doing unless by continuous and thorough doing. To get a history of one case, to conduct the physical examination of a second, to make clinical laboratory examinations of a third, and probably never to see any one of the three a second time, is not a discipline that can be substituted for combination and correlation of all three on patients observed from beginning to end. The things just mentioned have indeed their uses: a man must be trained to get histories; he must be trained to observe physical signs; he must have a course in the clinical laboratory. But unless these separately acquired skills are finally brought together and continuously used together, he has not been trained to obtain and to comprehend the necessary factors in their relation to one another.

The backbone of clinical teaching in Germany is the demonstrative lecture; merely theoretic or didactic discourses or exercises are entirely unknown.[1] Straight from the study of anatomy and physiology, without previous training in pathology or physical diagnosis, the student takes his seat in the amphitheatre to listen to non-systematic clinical lecturing in medicine first and foremost, subsequently in surgery, obstetrics, etc. A full account of just what he must and of what he does attend will be given when we come to consider the curriculum; suffice for the present an account of the methods of teaching as such. The text of the lecture is a concrete case exhibited in the arena. In its course two or three cases are shown. The professor reads, first, the history taken by an assistant; next, the laboratory findings contributed by another. He himself then proceeds to point out the significant physical indications. The student witnesses at long range the process of arriving at a diagnosis. But the German professor does more than make a diagnosis. He goes on to a luminous and comprehensive discussion of the entire topic, dealing exhaustively and scientifically with the

[1] There is little doubt that in abandoning the systematic lecture the Germans are right; the pity is that it has not been more largely relinquished in anatomy. The theoretic lecture is retained because it is alleged to "round out" the student's knowledge. As a matter of fact, this appearance is highly deceptive. The student's knowledge remains fragmentary despite its seeming completeness; it would be more wholesome for him to feel its fragmentary character than to be told that he has achieved a bird's-eye view of the whole, in which vast abysses of ignorance have been skilfully glossed over.

causation, development, and treatment of the disease, incidentally giving due recognition to those who have contributed to the literature of the topic. Slides representing pathological conditions in previous cases that have passed through the clinic are projected upon a screen; gross specimens brought from the museum are demonstrated; and microscopes with mounted sections are at hand for those who can afterward pause to look into them. At the close of the hour, the subject has been presented in all its relations, historic and scientific; guiding principles have been established and inculcated; a competent and attentive listener is in position to plunge into the literature of the subject without danger of getting lost.

One hears poor lectures occasionally; but the general level is extraordinarily high. The German professor talks with ease and force. The daily event has been conscientiously prepared for in advance. The professor knows the case and the literature; supplementary and illustrative material is ready for him when he wants it. There is indeed the best of reasons for keeping up to the mark: for dull lecturing will soon empty the auditorium. In the summer semester at Munich, Müller lectures daily at 9.15. Shortly after 8.30, the hall begins to fill; by 9 o'clock, every seat is taken; chairs are brought in until every available inch of space is covered, — there is barely room for the professor, his patient, and the assistants. The auditorium is a primitive affair in the old municipal hospital; but it possesses all the essentials, — reflectoscope, screen, blackboard, running water, table with reagents, microscopes, etc. A path is opened in order to wheel the patient in. The professor reads the history; displays on the blackboard the temperature chart; then in quick, clear fashion explores the patient, pointing out what he finds, discoursing on its significance, suggesting alternative explanations, until he settles down on the most probable diagnosis. This furnishes the topic for development and further illustration. The etiology, the pathology, the therapeutics, of the condition are set forth with wonderful vigor and lucidity. My notes abound in accounts of similar discourses. The effort made to prepare for a complete exposition is everywhere striking. For the last lecture of the semester a case of progressive paralysis was to be exhibited. A series of charts had been prepared expressly, exemplifying step by step the progress of the case since it first came under observation a year or more previously; drawings had been made to show the range of vision in each eye at regular intervals during that period. Finally, after thorough exploration of the patient, a reflectoscope demonstration was given of sections of the spinal cord responsible for analogous degeneration in other patients who had been under observation in the clinic; in one of these latter, acute disease resulting in death had interrupted the developing paralysis; in another, a similarly terminated degeneration had not yet proceeded far enough to start paralysis, the microscope indicating the fate that the individual had escaped. It is hard to overrate the contagious and stimulative effect of such discourse — clear, logical, comprehensive, and at every step concrete. A master mind at work is exhibited daily to two hundred students or more.

These are the two strong points of the clinical lecture: it enables a strong man to influence a large student body, out of which by selection the really capable are picked in order to enjoy closer intercourse with him ultimately as volunteers or assistants; the presentation constitutes an object lesson in scientific method, for the single case is first studied, then classified, and finally made the basis of a series of generalizations which relate it in all its aspects alike to what is known and to what is obscure. The best teachers make for the lecture no other claim. "The chief emphasis of the lecture does not fall on the examination of patients by students; in the foreground stand rather close examination by the teacher and thorough discussion of symptoms and therapy. This seems to me the main function of the internal clinic, which under existing conditions is only to be attained by slighting practical work by the student at that time."[1]

On the other hand, it must be confessed that one does not follow a series of such discourses with much profit unless a considerable personal experience has preceded. The lecture is concrete to the extent that the patient lies there to be looked at; test-tubes, pathological specimens, projections, add a certain sense of reality that a text-book or a didactic discourse conspicuously lacks. None the less, there is from the standpoint of the young student a good deal of remoteness about it at bottom. For even though he handle the preserved specimen and examine the microscopic slide, he does not himself study at first hand the patient about whose physical condition the entire performance turns. As to that, he has only the professor's word. Can this vicarious experience actually sustain the structure built upon it? Only if a rich experience has previously contributed such a store of sense perceptions that words are now as effective as things. This is not the case. For the average student, lectures of the type described form the introduction to clinical study. No solid background of previous experience vitalizes the terms and symbols which come up to him in quick succession from the arena into which he gazes. No effort is made even to adapt the lecture by making a distinction between elementary and advanced instruction. Students in their first clinical semester, students in the last, and graduated physicians listen to the same lectures. They are bound to be, for the most part, "words, words, words," lacking the fullness and warmth which prior experience could alone contribute to them. And not only does nomenclature convey no precise or realizable meaning: it does not even assist or encourage observation. It is more apt to prove an obstruction to observation. Familiarity with terms breeds contempt for experience. Terms are helpful counters with which to facilitate genuine mental operations only if a kernel of actual experience lies in the heart of them. Indeed, during the early stages of learning, names ought to be subsequent to experience; at least, between names and experience the mind must fly back and forth until the idea has defined and actualized itself. When a more or less varied fund of ideas has been thus acquired, discussion may take place to good advantage; for then only can generalization really embody the student's living sense of what Professor Dewey calls "the net meaning that emerges from dealing with particular facts." The clinical lec-

[1] Private letter from a professor of internal medicine.

ture inverts sound pedagogical order in coming before the experience that it proposes to expound; and it errs further in substituting at the start a related or described or exhibited experience for a personal one. Grant for a moment that the German theory is sound; that the student can be schooled to scientific thinking by witnessing a succession of admirable exhibitions of the art. Even then the endeavor must fail, unless through experience a sound basis in sense perceptions has been acquired previously.

But the theory is not sound, or perhaps better, not sufficient: the student expects not only to understand conditions, but to practise an art. Subject only to the requirement of the hospital year, — to be presently discussed, — the German student of medicine may, and usually does, go straight from the university into practice. A long apprenticeship converts the philosophically and theoretically trained jurist into a lawyer before he can practise his profession independently. No such provision insures a guarded and lengthy experience to the physician before entering upon practice. He goes, I say, in most cases, almost straight from the university to attend disease, accident, childbirth, in the home. To him, therefore, the university has got to be a *Fach-Schule*, a technical school, though, of course, not merely a *Fach-Schule* in the narrower sense. But a technique one does not master by looking or listening. It has got to be learned, if at all, by doing. I pointed that out in discussing the character of modern medicine: on the side of ideas, mediaeval medicine dealt with abstract principles that could only be talked about; modern medicine deals exclusively with sense perceptions, out of which it derives such principles as it has arrived at. The student can understand scientific ideas only in so far as he himself shares in a repetition of the experience out of which they have been developed. Precisely the same holds of medical or surgical relief. It demands technical skill, — whether in manipulation or inference is immaterial. Let the student watch another ever so closely, let him even himself learn separately a few tricks or devices, his own fingers, eyes, ears, brain, make thus no progress toward effectual coöperation. That he must do time and again with the assistance, supervision, and under the control of the teacher; and not after he has learned, but while he is learning and as the means of learning. The child told never to approach the water until he has learned to swim is the analogue of the student not carrying a case through until he has learned to do so. His actual responsibility must not be great, nor must it expect to make of him a complete doctor; but in form it must reproduce that of his master, if it is to start him on a line of scientific and practical development. Ostwald has put his finger on the weak spot: "In place of the lecture, which means mass teaching paying no regard to the individual, various arrangements for practical instruction are making their way. The essential point is that the apprentice under the personal guidance of the master learns what is most important and significant, and what can be taught, namely, the procedure of investigation. It is no longer enough that a student appropriate what excellent men have done before. How to work must be taught and learned, and this is not to be accomplished by means of lectures: one must put the student to work."[1] This is no argument for the sacrifice of scientific spirit to "practical" training; it implies, however, that genuine scientific discipline is an active, not a passive, process.

There are of course other objections to the lecture besides passivity: it is discontinuous. The student sees a patient once; what happens subsequently he does not see. How is he to appreciate the course which typical diseases actually take? At best, he may hear about that from time to time; perhaps ultimately witness an autopsy. But what is the result of the therapeutic procedure indicated in the lecture, and what the subsequent development of the processes pointed out, he has no opportunity to observe. Nor is he forced to think in clear and orderly fashion by being required to register his observations and thoughts in black and white. Again, lecturing almost inevitably overtaxes assimilative power. Lecture appointments come at successive hours. Unlike practical work, they have a set beginning and a definite end. Under the impression that knowledge is to be accumulated and training obtained in that way, the student arranges to hear a succession of discourses daily. In the course of a few hours, his mind is overwhelmed with facts, theories, and ideas delivered to him far more rapidly than his mental processes operate: they simply stop. In the end, he is compelled on the advent of the examination to get ideas clear, at least in form, by conning quiz-compends. The psychology of practical work is just the reverse. Experience tends to set itself in order; it knits or arranges itself with but the simplest explanations by the instructor.

So far, I have considered the lecture alone, because it is the customary and traditional form in which instruction is imparted. The German university is historically a lecturing institution. Knowledge was thus handed down, principles expounded and passed on. As science developed in the last century, the critical and investigative spirit took hold of and adapted the ancient structure. In seminaries and laboratories, small bodies of advanced students came into contact with active investigators in history, language, chemistry, and biology. But medicine presented a problem of its own, in the numbers of students to be handled, in the necessity of welding together portions of many separate sciences into one practical art. This necessity led in the first place to substitution of the non-systematic clinical lecture for the didactic expository or philosophic lecture. But even though concrete ideas could be thus more or less successfully communicated, the student gained no practical skill. It was obviously necessary to supplement the lecture with certain correctives. We shall soon see[2] that the official curriculum is still almost wholly a matter of lecture courses; but directly or indirectly, an effort is made to correct and amplify lecture hearing by actual training. Let us examine the machinery provided for this purpose.

The student has four different chances to correct the defects that inhere in lecturing. The first is provided by the so-called "courses." Diagnosis depends in the first

[1] *Forderung des Tages*, p. 567 (condensed).

[2] Chapter x.

place on the arts of palpation, auscultation, and percussion; in the second, on the ability to examine blood, urine, and sputum. Optional introductory courses of both sorts are offered at small cost by the assistants in the medical clinic;[1] in the same way, courses in bandaging and surgical diagnosis are offered by the assistants in the surgical clinic, manikin courses by those in the women's clinic. The abundant material of clinic and policlinic (out-patient department) is freely at the disposal of these instructors; the courses are so numerous that the attendance is usually not too large to enable student and instructor to work together under proper conditions. As they are the main support of the docents giving them, and students are excellent judges of effective drill, competition brings about thorough teaching. How far the lecturing is thus corrected remains a question: in the first place, if the courses are really to enlighten the lectures, they ought to precede them. That they rarely do. At best they begin in the same semester as the lectures; frequently not even that.[2] For the youth may pick up the necessary technical tricks after he has heard all the lectures he requires. Some students get no systematic courses at all; for they are not required to take them. A student may, if he chooses, get a little coaching before examination or acquire the essential elements incidentally by working in the clinic as *famulus*. But in any event, "courses" can teach only the use of technical devices. They give no opportunities for thorough and continuous clinical observation. In one course the student sounds a chest; in another he examines a specimen of sputum. But the sputum and the chest do not belong to the same patient, and he cannot safely interpret them apart from each other and from other data now and subsequently obtained. Hence, the course itself, while training the student to use certain diagnostic methods, does not correct the lecture in so far as the lecture fails to enable the student to participate in complete and continuous observation of the entire process of disease.

The other three devices aim to do this very thing: a required clinical lecture course does not count for the student unless he has served as *Praktikant* in connection therewith; he has also the option of attending the clinic informally as *famulus* or *hospitant;* finally, at the close of his medical studies he must serve a year's interneship.

First as to the *Praktikant*. What happens is this: at the beginning of each lecture, two or more students are called into the arena from the list of those who, having paid the fee, expect to obtain credit for the course. These are the so-called *Praktikanten*. Theoretically, they are supposed to examine and interrogate the patient and to propound a diagnosis and a line of treatment, which they must then defend against the professor.

As a matter of fact, the thing is not feasible. To begin with, as the clinical teaching is not graded, the student has not been led up to the part which he is abruptly

[1] In rare instances the professor himself conducts the course in auscultation and percussion; Müller does this at Munich.

[2] See below, chapter x.

required to play.[1] At most he has had a course in physical diagnosis; perhaps not even that. Moreover, professors tend to present to their class "interesting," that is, difficult cases; first, because they care about them, second, because the auditorium always contains advanced students and graduated doctors, to whom something can really be communicated. Where and how is the untrained "practitioner" to begin? It is all very well to urge the old principle: throw a man into the water and tell him to swim. A sorry line of casualties mark its application to education. Of a totally strange situation there is simply no way for the average student to take hold.

Moreover, even if he knew a trick or two, the conditions are most unfavorable to their profitable employment. An audience ranging in size from 50 to 300 is looking at a necessarily awkward beginner. Without previous sight of the patient,[2] he has to elicit important facts in short order and to venture an explanation. He knows little, he has had no experience; publicity awes him; time presses. The professor gives him a cue, watches him fumble, and then, almost without knowing it, takes the ball, as indeed he must. He has to choose between working with one *Praktikant* and entertaining his large audience: no one successfully achieves both. In a few moments the *Praktikant* has slunk out of sight. He stands inactive first on one foot, then on the other, during the remainder of the period. His practical participation has therefore amounted to nothing: were it very active, indeed, it would not materially affect the character of instruction unless frequently repeated. As a matter of fact, only two such appearances are required per semester, and books are generally signed up quite regardless of the quality of the response. Meanwhile, the professor, once fairly in the midst of his topic, forgets all about the *Praktikant:* what started out to be model practice for him becomes an exercise witnessed passively by the entire class.

My notes contain many accounts of *prakticieren.* It works better with small classes than with large; but the amphitheatre so effectually separates arena from auditorium that the teacher cannot continuously command both. Few teachers even try. I recall two characteristic occasions, one at a large, the other at a small, university. In the former instance, two *Praktikanten* appear, after a dozen names have been called. The professor sets them to examining the patient. They are completely nonplussed. He directs their attention to a certain spot: "Can't you feel a cyst?" They are not quite sure. With some hesitation one of them ventures a timid "Yes." It is not quite convincing. "Really?" the professor inquires. There can apparently be no doubt it is there. "Yes," they both reply with emphasis; and that is all. By the time

[1] In a few institutions, "propaedeutic" clinics have been established; but they have not met the difficulty. The "propaedeutic" clinic may be just as advanced as any other. Even where, as at Berlin, simpler material is presented, the method of presentation is the same: the student looks on. I witnessed such a clinic attended by 70 students at Berlin. A tuberculous child and a woman with a floating kidney were demonstrated. An assistant led the child around the room to show the Von Pirquet reaction; the professor alone examined the other patient, holding up a bandage which was to be relied on to prevent discomfort. At the end of the hour, the patients sat in the arena, 15 or 20 students crowding around each; within five minutes, over half had left.

[2] In some clinics, the *Praktikant* has an opportunity to examine his patient beforehand.

the second patient is brought in, the professor has wholly forgotten about his student assistants. He examines, describes, expounds. A third case is brought in,—typhoid, it proves. The professor does everything. Twice only are the *Praktikanten* addressed,—once with a request to look at the roseola, again to feel the spleen. Thenceforth they retreat ever further into the background, differing from the students in the benches only in being a little closer,—and much more uncomfortable.

In the other instance alluded to, there are only thirty students in the auditorium. The professor, three assistants, and one *Praktikant* occupy the arena. The patient enters. The professor reads the history, makes the examination, and then gives the whole thing away before he even becomes conscious of the presence of the *Praktikant*. The latter never elicits for himself and reports a single fact; once he listens to the heart beat after he has been told what he will hear. Whether even then he actually hears it, there is no telling. A strange discoloration of the patient's mouth being noticed, the entire class files by in order to see it: so that in a small school the *Praktikant* gets very little that all cannot get. Everywhere, all students are *Praktikanten* to the extent that they are privileged to remain behind after the lecture in order to examine for themselves the patients demonstrated. But crush and haste combine to deprive the opportunity of any considerable value. I have some figures that show what it amounts to: in a Vienna clinic which eighty students attended, five stayed after the lecture. On another occasion elsewhere, three cases had been shown to about ninety students; immediately after the lecture, between twenty and thirty students crowded around each of the patients; in two minutes by the watch, two-thirds of them were gone; all but five were gone in less than five minutes. *Prakticieren*, therefore, cannot be fairly said either to supplement or to mitigate excessive lecturing. It is a futile device.

What I have called the second corrective is entirely optional, consistently with the German notion that it is the business of the university to offer opportunities, allowing the student to avail himself of them or not at his peril. The student, if he chooses, may serve as "famulus" or "hospitant" in one or more clinics. In this capacity he is a helpful guest in the wards and laboratories. He does whatever he can and will, making himself useful as a "cub" or "fag:" follows the chief on his morning rounds, the assistants in the afternoon; examines patients, writes up histories, studies blood, tissues, urine, in the clinical laboratory to his heart's content. There is no denying that the *famulus* gets an excellent opportunity of precisely the proper kind; indeed, the readiness with which the German system provides such optional opportunities for the able and willing is the strongest point in its favor. Let the university proffer opportunities: students worth saving will utilize them,—a rigorous discipline, excellent in its way; in the domains of language, literature, and philosophy, perhaps excellent altogether. For pure science and pure scholarship know how to protect themselves against impostors: the student who misuses or neglects his opportunities in these fields achieves nothing,—that ends the matter. He indeed suffers; but—so it is argued—there is no helping that. In no event could he have been saved to competent or productive scholarship. "Boys must be risked that you may get men," said Herbart.

The case of the medical student, however, stands somewhat differently. The productive scientist the university can fairly leave to his own devices,—the productive medical scientist like any other. Research anatomists, research clinical chemists, must appear before the bar of expert opinion: society is thereby amply protected against mischievous error as to matter of fact. But the world in which the physician plies his vocation is absolutely without any adequate protection whatever, once the state admits him to practice. His hold upon public confidence may be in no small measure independent of his competency. I abstract for the moment from the protection afforded by entrance requirements and qualifying examinations: just now, we are concerned only with the guarantee and protection afforded by the training as such. What Ostwald calls the "antiquated lecture procedure"[1] furnishes no adequate guarantee; "prakticieren" does not help it. "Famulieren" is in conception far sounder. Let us see whether it is sufficiently general, varied, and prolonged to save the day.

In the first place, we must reflect that required lecture courses are so numerous that a student can become a *famulus* during semester only if he freely cuts his lectures: perhaps one may judge as to the repute in which lectures are held from the fact that some clinicians accept as *famuli* only students who are willing to desert the auditorium for the time being. The vacation, however, is generally regarded as the proper season for *famulieren*. On the face of it, it is improbable that any but the more industrious will devote their holidays freely, despite their undue length, to this somewhat arduous service. As a matter of fact, despite the general reliance upon *famulieren* as a supplement to the lecture system, no one has ever undertaken to gather statistical information as to its operation. One is sometimes told, "Every one becomes a 'famulus,'"[2] but I am persuaded that this is far from true. One of the Berlin internists assured me that comparatively few students serve in this capacity; a student who had just finished at Berlin, after spending the earlier semesters elsewhere, judged that not over 50 per cent of his acquaintances had been *famuli* at all; a professor extraordinary opined that perhaps one-third of the student body serve in several different clinics, one-third more for a brief period in one clinic, the remaining third not at all. In Vienna, an assistant in one medical clinic estimated that on the average perhaps 30 per cent of the students work as *famuli;* a professor in another, a good deal disgusted with the Austrian student, declared that of 150 enrolled students, not over half a dozen became conscientious *famuli* during either semester or vacation. At Munich, the custom has fallen off since the institution of the practical year. The most favorable conditions exist in the medical clinic at Leipzig. There, as far back as the sixties, Wunderlich introduced the practice of dividing out the daily incoming patients to the students, who became virtually clinical clerks. The privilege

[1] "Das veraltete Verfahren der Vorlesung." *Grosse Männer*, p. 417.

[2] "Jeder famuliert."

still continues. Every student has thus the chance to observe continuously ten to twelve patients in the course of the semester. Estimates differ as to how regularly the students take part: one authority ventures "a half," another "a considerable number," a third, "the industrious."

Famulieren is therefore by no means universal: is it sufficiently varied? Once more, despite the importance attached to it, there are no facts at hand. I took occasion at Vienna to sample the situation. A *famulus* in his last semester of study ascertained for me by personal inquiry how varied had been the experience of 22 fellow students in their final semester, all having completed their *famulieren*. All had been *famuli* in internal medicine, averaging a little over five months each; of the 22, 15 had never been *famuli* anywhere else; of the remaining 7, 4 had been *famuli* in surgery (on the average less than two months each), and 3 in dermatology (on the average a little less than three months each). None had been *famulus* in obstetrics. A similar inquiry was made for me of 17 students in their last semesters at Berlin: 10 had been *famuli*, 5 in both medicine and surgery, 1 in pathology and surgery,[1] 4 in medicine.

Finally, what is the service actually worth to the *famulus?* It is undoubtedly of very uneven value. Leipzig has come nearest to organizing it on a definite basis. The late Professor Curschmann had prepared a printed statement running somewhat as follows:

> "In their own interest I beg my students to observe the following:
>
> "Before entering my clinic students must be trained in pathological anatomy, general and special pathology and therapeutics, and, above all, in the arts of percussion and auscultation.
>
> "All the patients in the medical division will be assigned to the *Praktikanten* for continuous clinical observation, the more difficult cases to the more experienced.
>
> "In reference to their cases students are expected to prepare a complete history, with especial attention to the 'anamnese,' the findings on the original examination, the more important developments in the course of the disease, the general and special treatment. Acute cases ought to be visited daily; chronics at least twice weekly. The wards are open for the purpose 8–12.30 A.M., 3–6 P.M. I recommend students in case of difficulty to appeal to the assistant in charge of the 'station,' who will facilitate their work in every direction. Industrious attention to the assigned patients and carefully prepared records are among the most important features of clinical training. They distinctly influence my opinion of the capacity of the student.
>
> "For chemical and microscopical study, a room equipped with microscopes and reagents adjoins the amphitheatre. I recommend its free use and shall be happy if investigations extending beyond immediate need are there undertaken."

This is the *famulus* at his best. Definition is in general much looser. One hears it alleged too often that the *famulus* is not assigned to the assistant to train so much

[1] Two of the *famuli* had served three times each in surgery.

as to do chores; the head does not concern himself about the amount of training that the *famulus* derives from his service. In one place he is employed in lieu of a typewriter;[1] elsewhere he is a sort of higher servant. But sometimes he gets almost the opportunities of an under-assistant. The value of the arrangement therefore varies greatly. It depends partly on the student, but partly also on the assistants into whose hands he falls. This vagueness cuts both ways: it gives an unusually keen *famulus* an extraordinary chance; but it may also tend to empty the function of definite content. For a precise and systematic responsibility cannot be left to a precarious agent without assignable function. The *famulus* suggests the English "clinical clerk;"[2] but he is inferior to the English analogue in variety of service, universality of custom, and definiteness of responsibility.

So far, then, the undergraduate student cannot in general be said to receive actual training in the wards. His case is not materially bettered by the so-called "clinical visits" announced at Berlin, Würzburg, and elsewhere. In the first place, they occupy only one hour once a week; in the second place, undergraduates rarely attend. Instruction described as "at the bedside" in Leipzig means only a course in clinical microscopy, in which the student analyzes blood and urine from patients unknown to him; there also I met an assistant who was followed on his rounds by students "every week or two." Except for *famulieren* on Curschmann's plan, the wards at Vienna are probably more freely open to undergraduate students than those anywhere else. But the defects of their training are disclosed by their reluctance to enter them. In the already mentioned clinic, in which 150 students are enrolled, not more than ten attend the regular afternoon rounds of the assistants, and, remarked an assistant, "almost always the same ten." In another, I was told that I should find something like twenty to thirty students attending between 4.30 and 6. It just happened that on the afternoon of my visit one undergraduate student appeared between 5 and 5.45; all others in attendance were assistants and volunteers. The student in question had prepared a case history, but made no physical examination; in the next ward we heard that a student had been there and left. The assistant explained: "Of course I compel no one; nor do I bother about those who either don't come or don't take it seriously." A professor summed up the situation for me as follows: "In general, the participation of the students in the direct examination and observation of patients at Vienna is extremely defective, though everywhere opportunities abound." He might have added that the amount of material in clinics and out-patient departments is so rich that the Leipzig plan could be regularly instituted without difficulty. The obstruction is historical, as we shall hereafter see.[3]

Pressure from the practising profession has led in recent years to the insertion of a hospital year between the university and professional practice in the German Empire. Admirable in conception, the device has yielded very disappointing results. The reason seems clear: it is another case of locking the stable after the horse

[1] "Als Schreibmaschine ausgenützt." [2] See chapter viii. [3] See chapter x.

has strayed. Free run of the hospital for a year furnishes experience, not training; how much the experience will in general profit depends on the sort of training the interne has had beforehand by way of preparation. If as student he became accustomed to passivity, he will as interne tend to be helpless. The practical year could succeed only with well-trained students capable of being used in the conduct of the hospital. Its proper use would then be as a bridge between training and practice; fundamental training it cannot itself supply. In other words, listening and doing form between them an active practical habit only if a relatively small quantity of listening has been thoroughly kneaded into a relatively large quantity of doing. Three years mainly of listening followed by one year intended to be wholly of doing is the wrong proportion in the wrong chronological relationship.

Other difficulties, less fundamental, have arisen. If the *Praktikant*[1] is to be used, the hospital must be so reorganized as to give him a responsible function, thus probably improving the situation of all parties concerned,— students, assistants, and patients. Thus far, no such adjustment has taken place, in consequence of which there is nothing in particular for the *Praktikant* to do. Recently, a petition has been sent to the Government begging larger opportunities for the *Praktikant* in some one division, if it is not feasible to give them generally. "Even one-sided training would be better than the present lack of duty or occupation." The attitude of the assistants now decides: if that is sympathetic, the *Praktikant* gets a good deal; if not, he may be insensibly turned into an amanuensis; or worse still, lacking oversight or responsibility, the fresh graduate may waste the year in reveling.[2]

Hospital managers have also done something to defeat the purpose of the enactment. The number of hospitals authorized to receive *Praktikanten* is quite large. It was intended that *Praktikanten* should be subordinate to the assistants, who were to supervise their activities. But the weaker hospitals have used the concession to get rid of assistants altogether, by way of reducing expenses. They offer free quarters and small salaries to *Praktikanten* who are looking for an opening,[3] and then use them in place of assistants who would get higher pay. In addition, the required service as *Praktikant* is alleged, curiously enough, to have reduced the number of those offering for assistantships. Enforced work during one year seems to disincline men to voluntary effort for two or more. If this is not corrected, the practical year will tend to break down perhaps the most valuable feature of German clinical organization. Finally, the hospital year is not always a hospital year: for two-thirds of it may be spent in laboratory work. One concludes, therefore, that the value of the hospital year will depend on the previous improvement of the clinical teaching, and on the reor-

[1] His proper designation is *Medizinal Praktikant*, whereby he is distinguished from the *Praktikant* of the *Vorlesung* above described. In the present connection the word has reference to the practical year.

[2] "Das ganze Jahr wird jetzt verbummelt," is frequently charged.

[3] See advertisements in the German medical journals.

ganization of the hospital so as to promote a sound relationship between the assistant and his youthful charge.

Those who admit more or less fully the defects which I have pointed out, hold that they are, or must be, mainly corrected in the policlinic. But, as a matter of fact, they cannot be. However useful the policlinic, its patients come irregularly, cannot be sufficiently controlled, and represent only certain types of cases. Undoubtedly, subject to these limitations, the out-patient department is capable of furnishing a highly important training. But, except in so far as its material is utilized in giving practical courses in physical diagnosis, laryngoscopy, etc., it now really contributes as a rule no novel features to clinical teaching. It serves for the most part as the reservoir which feeds the clinic and from which the assistants procure material for their courses. Percussion, auscultation, bandaging, ophthalmoscopic, and other practical courses are largely conducted in the out-patient departments, where an abundant and varied supply of material is at hand. This material, strictly speaking, belongs to the chief; assistants employ it by courtesy. Now it happens frequently that the calling of the chief results in leaving behind a number of docents and *extraordinarii* who have been his assistants; the incoming chief, as I have already mentioned, chooses or brings along his own assistants. Those displaced continue to possess academic titles, but lack material with which to teach.[1] This has resulted in the establishment of private policlinics, especially in larger towns.[2] A docent, now no longer an assistant in the clinic, opens a private out-patient department in connection with his office in the vicinity of the university policlinic, if possible. He thus keeps his name in the university catalogue, is in position to conduct courses, and profits directly and indirectly. Occasionally, such policlinics are well equipped, and the courses offered are well attended. Many of them, however, lack both equipment and students: they continue to be announced from year to year because the nominal university connection has a certain merchantable value. At Breslau, I tried to visit one of them, suspicious because it purported to be held across town from the medical department. At the announced hour I found neither docent, patients, nor students, and was informed by the *Pförtnerin* that the docent had left his office "long ago."[3] At Munich, it is proposed to limit the docentship to a term of years in order to prevent the exploitation of the title. At Vienna, the dispossessed instructors—that is, men holding academic titles, but without teaching material—combined in 1872 to establish a policlinic, to which recently a clinic of 120 beds has been added. A similar establishment on a smaller scale exists at Leipzig.

In large centres, out-patient teaching is carried on in the clinical amphitheatre: it differs from teaching with in-patients only in that the patient has his clothes on.

[1] This difficulty cannot arise in subjects like languages, economics, mathematics. For the docent gets easy access to the library and needs only a room in which to meet his class. That the university affords.

[2] Private clinics belonging to professors extraordinary are used in the same way.

[3] "Schon lang weg."

A policlinic exercise in psychiatry at Berlin was attended by 300 hearers. Each enrolled student serves as *Praktikant* twice a semester under the conditions heretofore explained. The discourse is admirable: beginning with a concise elucidation of the essential features in the case displayed, it rises at once from the patient and fairly sweeps the entire horizon of the topic in hand, always in close touch with actual phenomena, yet without slavish adherence to the instance just then in the arena. In one of the medical policlinics of Berlin, attended by some 200 students, I witnessed a demonstration of a case of obesity, in which five *Praktikanten* were simultaneously supposed to be engaged. Every fact of importance was promptly ascertained from the assistant who had previously examined the patient and communicated by the professor to the entire audience without any activity whatsoever on the part of any of the *Praktikanten.* A heart murmur was announced: only one of the five verified it. Here as elsewhere the striking features were the passivity of the *Praktikanten* and their meagreness of response when addressed, on the one hand, the breadth, vigor, and richness of the presentation of the professor, on the other: for the air was saturated with ideas,—this simple case of obesity being illuminated with a profound and incisive discussion into which historical, social, physiological, and geographical considerations entered. It is, I believe, impossible to overestimate the stimulating effect of such talk; but it cannot possibly reach the end desired. As a matter of fact, of the five *Praktikanten* on this occasion, only two uttered a word and only one touched the patient.

Substantially the same procedure, on a smaller scale, takes place in smaller universities. At Greifswald, Würzburg, etc., an ordinary room is used, the students sitting around in class form. Patients are introduced, and the students in rotation serve as *Praktikanten.* The performance is more intimate and responsible than in the big amphitheatre. But it is mass teaching still, despite the abundance of material and the smallness of the student body. Nothing but the persistent lecture tradition hinders actual participation by individuals and small groups.

At Munich alone—as far as my experience goes—is an effort in the latter direction made: even there limited to internal medicine, though *famuli* and volunteers take part in other divisions. The out-patient department—the Reisingerianum,[1] so called in memory of the original donor—is perhaps the most commodious and convenient in all Europe. The division of internal medicine is presided over by a chief and four assistants, each in charge of a subdivision. Four graduates doing their practical year, volunteers, and *famuli* attend: in addition, the undergraduates who must earn the requisite *Praktikanten* certificate or credit. The last named receive the new patients for independent examination, compile the necessary history, and make urine tests for albumen and sugar, prepare and observe blood and sputum slides, study

[1] See a description by Professor Richard May, *Münchener Medizinische Wochenschrift*, Nos. 2 and 3, 1911. The rules are printed in a little pamphlet, to be obtained either from the Reisingerianum or from the publisher, G. Franz'sche Hofbuchdruckerei, München.

X-ray photographs when made, and finally venture a tentative diagnosis. Though the student is throughout under the control of one of the assistants, his participation is distinctly active. In the afternoons, he may take part in district visiting.[1] This out-patient apprenticeship requires attendance for one hour twice weekly during a semester. Some effort is made to encourage regularity by requiring students to register attendance in the office and to adhere to the room which they originally select: the rules suggest that thus the *Praktikanten* will have the advantage of keeping track of patients who return for treatment.

Unfortunately, required participation of the kind described does not at Munich extend beyond the medical policlinic. At Vienna, on the other hand, one finds a sort of dressership in the surgical out-patient department. The class[2] in clinical surgery is divided into groups of ten to fifteen, each of which groups attends the out-patient surgery between four and five in the afternoon for a week or two. The members examine cases and follow the assistants; in their too brief service they can see a good deal, but do little. On the day of my visit, seven were present and the instructor congratulated the group on the large attendance.

The foregoing account has as a whole immediate reference to internal medicine, which receives in Germany its proper stress; but it is generally applicable to all clinical instruction. Everywhere the demonstrative lecture forms the backbone; and the part of the *Praktikant* is only rarely more than nominal.

I heard, for example, the concluding lecture of the semester in psychiatry at Munich. The exercise lasted two hours; seven cases were demonstrated. The *Praktikanten* stood by while the professor quizzed the patient. When he had elicited all necessary information, he turned to the *Praktikanten* with the question that at that stage really asked itself, quite regardless of whether one stood near the professor or sat on the benches. "What sort of clinical picture have we here? For," he added, "what we now want is diagnosis,—that is precisely the art of the physician."[3] Neither of the two *Praktikanten* recognized the picture. "I showed you a similar case in a former lecture; perhaps you were not present." Both thought they were, but neither recalled.

The surgical lecture takes two forms: operations by the wholesale in some places, diagnosis in others. At Berlin, three operations were simultaneously in progress before a crowded auditorium; six *Praktikanten* were on duty in the arena at once. A *Praktikant* ventured a diagnosis of "sarcoma." A brief colloquy took place between student and professor. Just what the former said was inaudible; but not so the professor's criticism that his "answer was several centuries behind the times." The youth was mute when required to give the distinction between sarcoma and carcinoma. None the less, he was "signed up," as was likewise another *Praktikant* who stood by with-

[1] One finds district policlinics, as these are called, elsewhere too,— for example, at Marburg, Tübingen, and Leipzig; but at the last named I was informed that the "students are too busy to go."

[2] The "class" always means those who have paid the fees for the course.

[3] "Diagnose,—das ist eben die Kunst des Arztes."

out opening his mouth the entire time. At Munich, the professor began by explaining a proposed abdominal operation by means of a chart. A dozen assistants stood around him. I sat a little to one side of the centre and saw nothing but the patient's covered feet and the crowns of the heads of the staff. The staff itself was so numerous that those in "the outer darkness" had to crane their necks to see anything at all.

At Würzburg, I witnessed a surgical clinic given to fifty students. Three *Praktikanten* were called down: a patient with a growth on the tongue was exhibited; questioned as to what they would do under certain conditions, not one of them replied. The lecturer thereupon explained; the *Praktikanten* were closer to the patient than the rest of the audience: other difference there was none. A second case — deformity of the lower limb — was introduced. The same procedure took place. The professor pointed out everything, to the *Praktikanten* as to others, — even the fact that the two limbs were of uneven length, — but none of the three was able at once to put his finger on the head of the femur. The truth is, that *prakticieren* is, as carried on, an absurd method. It could avail only if the student, after proper preliminary training, saw his patient in good time before the lecture hour, studied him carefully, and even read up the topic. He could then be quizzed to some effect; to expect an untrained boy to observe, to reflect, and to conclude on the spur of the moment, like an experienced consultant, is bound to yield disappointing results.

Payr at Greifswald[1] does little operating before the class; Küttner at Breslau, none at all. Their instruction is an exercise in surgical diagnosis. The classes being relatively small, each student can be brought into contact with a much larger number of cases; and a more or less lively participation by the entire class is possible. The results are immensely better. The *Praktikant* in the surgical clinic at Breslau examines the patient first; makes up his mind somewhat deliberately, is compelled to defend his position against the instructor, the class taking part spiritedly. At Vienna and Leipzig, optional courses of the same character are offered by assistants, the response on the part of the students being for the most part unsatisfactory. They appear to lack both skill and knowledge, somewhat more sadly than one would anticipate. Optional also are courses in bandaging and in operations on the cadaver. Courses in operating on animals are not as a rule offered to undergraduate students.

In the women's clinic, work is in general similarly organized. The fundamental technique is supposed to be cared for in optional courses offered by assistants, who have free use of the abundant material of the clinic. At Vienna, for example, these courses include the technique of delivery, diagnostic technique, pathological histology, manikin work, gynecological diagnosis and therapy, physiology and pathology of child-bearing, operations on the cadaver, etc. The student body disperses itself at will among these classes; and those who cannot, or do not, pay for courses take their chances of acquiring basis and technique as *famuli*. The lectures of the professor, meanwhile, follow conventional lines, — demonstration and exposition, with *prakti-*

[1] Now at Leipzig.

cieren. Greater care is subsequently taken to insure a minimum of practical experience. In the splendid new women's clinic of Vienna with its 700 beds, excellent quarters for undergraduate students are provided. In one of the services, every student gets a period of three weeks' actual residence: during the first, he examines cases of pregnancy and observes delivery; during the second, he attends gynecological operations as *Praktikant;* during the third, he follows in similar fashion the work of the septic ward. In Germany, the student does not necessarily reside in the obstetrical clinic during an appointed period; but actual participation in at least four deliveries is required.

The most recently developed of clinics is that devoted to pediatrics. The specialty, first differentiated in Austria, has now been recognized in practically all German universities. The Munich clinic contains 130 beds; the lectures are attended by 200 students. In the auditorium, scarlet fever, measles, diphtheria, and whooping cough are demonstrated; a class of 40 divided into two parts also goes into the wards. But the bedside work is not highly developed—"unfortunately," as my escort admitted.

As to the range of instruction offered in every clinical branch, what has been said of each of the underlying sciences may be repeated: every institution provides the fundamental courses of general importance; beyond that all go, and no two agree. At every stage, before and after graduation, the eager worker can procure further opportunity both in training and in research. At Vienna, in the winter semester of 1910–1911, about 120 different lecture and practical courses were announced in internal medicine, not reckoning individual researches carried on under the guidance of the directors; at Berlin, 80; the same rich and varied abundance is characteristic of other branches, each of which is presented on large lines, while within each, intensive and specialized work is offered for the benefit of capable workers. In internal medicine, surgery, gynecology, pediatrics, and other branches, clinics of broad scope are held from four to six times weekly; these furnish the backbone of the instruction, are in general character the same at all institutions, and are attended at one time or another by all students. Beyond this point, no two institutions agree. A few examples must suffice to indicate the variety and abundance which enables and encourages every student and every graduate to push beyond the elements at the proper time. From the Berlin announcement I may cite in medicine: traumatic origin of internal disease, diseases of digestion, diseases of the lungs, prognosis of internal disease, diseases of nutrition; at Strassburg, one finds a course in diseases of respiration and circulation; at Marburg, diseases of the spinal cord. In surgery, Vienna offers special courses in diseases of the urinary tract, orthopaedics, and a-typical operations; Würzburg in surgery of the brain, Leipzig in surgery of the kidneys and in military surgery. It is needless to extend this account to other departments, for in all the same conditions obtain.

The average student learns therapy non-systematically in connection with his clinical work, the main emphasis everywhere falling on diagnosis rather than on therapeuties. But for students at an advanced stage and for graduates, large provision is made in the shape of special courses. Berlin offers instruction in diet and dietetic cures, hydrotherapy, general therapy, diet management of internal disease, a therapeutic course in internal disease, therapy of neuroses, therapy of tuberculosis, therapy of infections; Munich, in special therapy, therapy of digestive diseases, physical therapy; Graz, in therapy of heart disease, of metabolic disturbance, and of the nervous system. Clearly, no student can leave such an atmosphere under the impression that his work is finished, that he knows his subject. A common misapprehension must at this point be guarded against. The more advanced courses above mentioned are specialized in character. There could, however, be no greater error than to suppose that the German clinician or surgeon is narrow in his training or interests, — narrower, for example, than the clinician or surgeon in countries where differentiation and specialization are not carried so far. The reverse is true: the German professor has had a superb training in the underlying sciences; and his clinical activity is deepened accordingly. In the general clinics which all students attend, as well as in the special courses, the treatment of the topic is exhaustive: pathological, physiological, and chemical sides are all presented. Topics are indeed specialized; but the presentation is broad, varied, and suggestive.

The defects in ordinary instruction have no essential connection with the merits of the German system. They mark only the failure of medical education to overtake medical thinking; they could be corrected without interfering with the organization or spirit of the clinic. I have already urged that a more orderly distribution of students would avoid repeated attendance on the same lecture courses and the overcrowding thus entailed. Under such circumstances, ward and out-patient work could at once be introduced into the smaller universities: at Erlangen, a start has been made in this direction.[1] At the larger universities, with their enormous amounts of available material, active participation of students in the wards and policlinics would also become feasible, if the faculties were reorganized and enlarged with this end in view; the too small hospital staff and the fee system are obstacles that must be got rid of. An intangible difficulty exists, too, in the fear that more sequence and arrangement portend the downfall of academic liberty. Though the freedom of the student has been more and more limited by the requirement of certificates for one course after another, it is still feared that the introduction of greater sequence might rob him of something that is precious and characteristic. The danger is indubitably a real one; for measures that converted the university into a secondary school would cost more than they are worth. The problem is to avoid this, while still retaining for the assistant his present advantages and giving the average student greater opportunity to participate after proper preliminary discipline.

So much for the methods of clinical teaching employed in Germany. But the reader needs to be warned not as yet to make up his mind as to its pedagogical

[1] *Aerztliches Vereinsblatt*, June 7, 1910: "Zur Erwerbung der Praktikantenscheine."

worth or its practical outcome. As to that, we shall be in no position to form an opinion until we have ascertained how the various factors, heretofore separately considered from the standpoint of method as such, are combined into what we should call the curriculum. But a word of caution is needed here, and will have to be repeated. An analysis of method, a description of the required curriculum, may be both fair and accurate without by any means exhausting the full significance and secret of German medical education. I have time and again emphasized the fact that the air of the German clinic is surcharged with ideas: a German professor cannot describe a physical examination without explicitly or implicitly giving the historic setting of the various elements disclosed; he cannot propose a line of treatment without a sketch, lucid and illuminating, however brief, of the chemical, physiological, and pharmacological investigations that have thrown light on the problem in hand. Be the technical defects of the German student's training what they may, be his fund of positive knowledge correspondingly meagre, —and I have no disposition to extenuate, — familiarity with ideas provides him with a principle of progress which will stay with him, to encourage him to acquire what he lacks in practical technique, to enable him to apprehend the quick development of scientific medicine. Even the average man gets this. The able, industrious, and strong have furthermore procured for themselves a training which, theoretically and practically, far outruns every limitation as to both quantity and quality that seems characteristic of the system.

CHAPTER VIII

CLINICAL INSTRUCTION: GREAT BRITAIN

The hospitals and infirmaries[1] in which clinical instruction is given in Great Britain are without exception voluntary institutions, mainly supported by annual subscriptions or gifts and governed by their subscribers through an elective board. The administrative staff is salaried; a few minor medical and surgical posts are modestly remunerated. But the important medical and surgical officers are volunteers, and the insignificant rewards attaching to paid appointments are little more than nominal when viewed in the light of their heavy burden of routine.

It is impossible within the limits of this chapter—and indeed foreign to its purpose—to do full justice to the efforts of these excellent establishments in coping with the formidable problems of disease among the too abundant Scotch and English poor. Suffice it to say that, whether wholly adequate or not, in this coöperative, voluntary endeavor all classes of society loyally and earnestly unite: the nobleman, the merchant, the artisan, together contribute to the funds and assemble to select the managers. No more admirable outlet for civic and social service exists in any modern nation. On the professional side, the spectacle is not less noteworthy: with one or another of the voluntary hospitals all the great names of British medical history have been associated as volunteers; and they are venerated with the intimate pride so charmingly characteristic of British devotion to its past. Harvey was physician to St. Bartholomew's during four and thirty troubled years: the rules governing the kinds of cases admitted to the wards drawn up by him at the request of the governors are followed there to this day. John Hunter, Edward Jenner, and Thomas Young, the last named the expounder of the undulatory theory of light, are among the glories of St. George's: in the board room there, one is still shown the couch on which, prematurely exhausted by his restless labors, Hunter breathed his last. Sir Charles Bell served on the staff of Middlesex; Cheselden was surgeon to St. Thomas's; Sir Astley Cooper to Guy's. On the roll of the Royal Infirmary at Edinburgh can be found the names of all the worthies who built up the medical repute of the university and the extra-mural school,—among others, the Monros, Rutherford, Cullen, James Simpson, and Charles Bell. Nor has this custom ceased to obtain. Our best-known medical and surgical contemporaries have attended or still attend the practice of the voluntary hospitals: Lister at King's, Treves at the London, Horsley at University, Lauder Brunton at St. Bartholomew's, Fraser and Gibson at the Royal Infirmary, Edinburgh.

While the voluntary hospital is supported as a charity, it has in its wisdom lent itself freely to concurrent educational use. It is as such only that it forms a topic for

[1] The terms are equivalent, "hospital" being in common use in London, "infirmary" in the provinces and Scotland.

discussion in these pages. I propose, abstracting from all else, to survey and to criticize it from the standpoint of modern medical education. I admit in advance a certain unfairness in this procedure: the voluntary hospital is a charity; it lacks the resources to be anything else. It may look ungracious to find fault with an institution, primarily designed to relieve distress, because its organization and conduct no longer answer certain rapidly changing secondary ends.

To deeper reflection, however, the entire situation assumes a somewhat different shape, for the problem of the hospital has itself shifted. That problem was, in the pre-bacteriological days, a diseased individual; now, the problem is disease itself. The necessity of this enlargement in scope has already been perceived by the more alert managers of the metropolitan hospitals. "They are not now, as they used to be, simply resting places for sick people, whereby food and warmth and rest and treatment are provided; their fight is not against disease in a sick person only, but against the sick person's disease," writes Mr. E. W. Morris,[1] the executive officer of the London Hospital. The patient is something more than an individual,—he is a warning, a problem, a symptom of economic or hygienic ignorance or maladjustment; remedial measures must be supplemented by prophylactic and investigative effort. In truth, effective charity of any sort nowadays involves scientific thinking. The relief of individual distress by direct ministration is not enough: we must indeed deal with the present results of untoward conditions, but the hope of society lies in ascertaining and removing their causes. True of all social endeavor, this is nowhere else so patent as in dealing with disease; nowhere else is the connection between ministration to the unfortunate victim and scientific effort to master the causes so obvious. Medical education and medical science thus become the province of the hospital in virtue of its primary charitable duty and purpose. The hospital cannot possibly discharge this original charitable function unless it endeavors to prevent the spread, and to attack the sources, of disease. But the features that have become essential to the effective doing of the original and conscious duty are the features to which discussion from the standpoint of modern educational requirements will call attention: if, therefore, it savors of unfairness to view the voluntary hospital strictly from the scientific and educational standpoint, it must be because the hospital has not yet adjusted itself to the requisite extension of its avowed object.

We have found that the hospital in Germany embodies the conception just stated. It relieves the individual; but it is at the same time deliberately occupied also with research and teaching,—occupied, that is, in social and scientific warfare on disease in its citadel; for disease is intrenched in ignorance, and can be dislodged only by knowledge. The professor of medicine in Germany is the leader in this struggle. It is precisely his function to lead in it. Though to some extent he practises medicine, he is first and foremost a teacher and investigator. His associations are with his fellow

[1] In a personal letter, slightly abridged.

university teachers. Whatever preëminence he enjoys comes to him primarily in virtue of his academic standing and scientific repute; it is a preëminence among scholars and scientists. By the standards and ideals of the teaching profession he is judged; for its rewards and distinctions he strives. The prominence of German medicine thus springs from the academic constitution and bearing of the medical faculty; from the fact that academic ideals, established in the university hospital, have thence spread until they now dominate the hospital system of all Germany: in consequence of which both men and ideas circulate freely.

Very different is the situation in Great Britain, where an informally constituted medical school was operated incidentally by the staff of the voluntary hospital out of which it grew. The voluntary hospital originated as a private charity; such essentially it still remains. Its history is in the main the story of personal devotion and sacrifice in the relief of individual misfortune. On this basis, educational activities, in some respects extraordinarily effective, have been built up; but the personal basis persistently limits their scope. The medical friends and connections of the hospital patrons and managers naturally became its medical attendants. On their ward rounds they were followed and assisted by students who had paid them for the privilege of thus working out an apprenticeship. Visiting and teaching functions became inextricably involved with each other under ideal conditions so far as the use of the hospital material is concerned. But the visiting function always maintained priority. The visiting physician or surgeon might teach; but he had to get his staff appointment first in order to do so. As clinical instruction in Great Britain is everywhere imparted by visiting physicians and surgeons, its value and character are determined by the ideals and constitution of the attending staff of the voluntary hospital.

What are these ideals?

The medical profession in Great Britain ripens in the consultant who represents the prosperous culmination of a successful professional career. The medical graduate makes at the outset a choice between consultant and general practice, but private practice of one or the other type is the goal at which he drives. The path to consultation practice leads through the hospital and medical school; aiming at that, he never embarks on miscellaneous outside practice at all. He sticks to the school and hospital, entering their service, on the conclusion of his studies, in any available subordinate post, and looking forward even then, at the end of a long but straight vista, to a house in Harley Street. For this he endures many years of almost unrequited routine. He learns his art in the hospital wards and in the out-patient department, by faithful attendance on the superiors into whose shoes he will eventually step. Long service makes of him indisputably a safe and able counselor. Once accepted as such, he reaps his reward. He becomes a member of the hospital staff, a lecturer in the medical school. His day now dawns. As a rule, hospital appointments have carried no remuneration; the school fees — once no insignificant item — are, in the London schools at least, almost entirely absorbed by the increased cost of the laboratory instruction.[1] But the indirect profits are, in any event, the important ones: from his colleagues and from his former students, business makes toward the consultants. Only a genius can build up a practice any other way,—an experiment almost never made. Teaching is thus the means to the desired worldly end,—like other means, liable to suffer when it has accomplished its purpose. The British consultant may or may not love or care to teach; but he has little choice if he wishes to achieve a typical success. The great lights of British medicine—John and William Hunter, Sir Benjamin Brodie, William Stokes, Sir James Simpson—have achieved just such successes. They were prominent personages in their day; their patients numerous and distinguished, their incomes large, their expenditure lavish. The standards by which they are judged do not differ essentially from those by which the successful barrister or financier is measured. They were indeed sometimes productive men,—Hunter and Simpson, men of original genius. But the words of Brodie's biographer are fairly applicable to the British consultant at large: "Brodie combined, in an unusual degree, success in practice with eminence in science; but it seems to me inconceivable that he should ever have sacrificed the former to pursue the latter."[2] The end is distinctly non-academic,—personal, not social, if social is understood to imply primary devotion to education and science.

Thereby it is at once marked off from the ideal of the German clinical and the English laboratory teacher. On this distinction, the entire argument that I shall submit hinges. The German clinician and the English physiologist desire primarily scientific repute. Whatever else they crave, they know at heart that they will be rated and graded by their scientific achievements. If the German clinician wants students and patients, if the English physiologist wants a call bringing increased salary,—in either case, success is conditioned on scientific achievement. Aside from the spontaneous scientific interest, which is, as a matter of fact, almost invariably his controlling motive, even worldly gratification hangs on unworldly distinction. The English medical man reverses the relationship. Intellectual ability occurs and is honored. The English consultants are cultivated, charming, and able men, excellent physicians, occasionally distinguished contributors to scientific knowledge. But the system does not seek out, does not reward effort or achievement in a scientific direction. For the consultant, scientific distinction is a becoming decoration: it is not the breath of his nostrils.

Between the teacher of physiology and the teacher of medicine, the distinction is thus, in Great Britain, one of kind, not of degree. The clinicians who largely manage the hospital schools judge rightly that physiology is an academic pursuit which must participate in academic renunciations,—renunciations that are not hardships to be borne so much as bulwarks to be thankful for. The physiologist is, as a mat-

[1] In the provinces and in Scotland, however, where the universities supply the fundamental instruction, clinical teachers still usually receive the fees of their students, and teachers who are also examiners derive a considerable income from the natural partiality of students for such instructors as guard the portals to the qualification. See chapter xii.

[2] Timothy Holmes: *Benjamin Brodie*, p. 126 (London, 1898).

ter of fact, rather too well protected; for simplicity overdone may entail embarrassment almost as distracting as prosperity. But at bottom the point is well taken: the cultivation and teaching of the medical sciences make for a quiet, scholarly, devoted career; on which basis the clinical teachers of the British medical schools are not, strictly speaking, to be reckoned in the teaching profession at all.

About that there is no false pretense whatsoever. A medical school seeking an anatomist or physiologist goes into the market and procures the best teacher and investigator it can afford. There is lively competitive bidding, in which all English-speaking nations join. But for physicians and surgeons the hospitals engage in no such competition: they are obviously seeking to build up not the best staff, nor the most productive staff, but just a good congenial staff; a staff composed of men who have grown up together in the same tradition, who like one another, who can coöperate in works of charity, and in professional matters lead up to one another's hand. They deliberately inbreed.

I have spoken of the unity of the London schools, of the split in the provincial and Scottish institutions.[1] In a deeper sense, the unity of the former is only geographical. Rightly taken, a medical school, organically one on the scientific plane, is not to be found as yet in Great Britain. Scientific medicine involves the adoption by the clinic of the methods and conceptions of physiology and the other sciences. As to this, it is immaterial whether the situation to be dealt with is wholly known or largely involved in obscurity. The validity of the scientific attitude does not depend upon accurate and exhaustive knowledge of the particular case in hand. If it did, modern medicine would divide into a scientific section, a section partly scientific and partly empirical, and a section wholly empirical. As a matter of fact, scientific method may guide the physician, whatsoever complex of factors he is handling, not only in handling what is mathematically exact. Krehl has recently pointed out that the concept of diathesis was expelled a generation ago from medicine as excessively vague and fantastic. The concept is now again discussed, but it is purged of all metaphysical mystery. Too complicated to be even yet resolved into known factors, it is nevertheless treated with the conscious critical severity that constitutes the essence of scientific method. The science that has most profoundly affected clinical thought on the Continent is, as I have said, physiology. Now, though physiology has had in England an exceptionally favorable development, it has not transformed medicine or surgery. The English physician does indeed employ diagnostic and therapeutic devices of laboratory origin: he uses the microscope, the X-ray, the ultra-violet rays. But these are the instrumental, not the conceptual, suggestions of the laboratory; except in isolated instances, the English physician is still of the intelligent empirical type. He has indeed studied pathology and physiology, and helped to teach them. But they were so much scaffolding, for the most part, to be kicked away when they have served their end. Once on the hospital staff, the typical English clinician gives up the labo-

[1] See chapter i.

ratory and with it the laboratory state of mind. He contributes no longer to theoretical literature; his world changes. He fraternizes with another social set. Bacteriologists, pathologists, and other laboratory men are the servants rather than the peers of the physicians and surgeons. Between them there is little genuine sympathy. The laboratory instructors have, indeed, proved so serviceable to both institutions that they have knit hospital and medical school closer than ever: the physiologist, who came in by the school door, trains the clinical clerks to examine blood and urine; the bacteriologist, entering by the same portal and becoming head of the clinical laboratory, makes diagnostic examinations for the staff; the teacher of pathology is chief of the hospital dead-house. But these services, rendered by the laboratory heads, remain on the instrumental basis. Medical and surgical practice has not been re-conceived in the light of conceptions which have emanated from the laboratories. The hospital schools thus continue to constitute a compact corporation, whose precise educational character depends at bottom on the terms of appointment to the medical staff.

The present staff member entered the hospital as student, and, rising steadily by seniority, will retire from his medical or surgical post at sixty or sixty-five on the basis of age. He has served in succession as house officer, resident, medical or surgical registrar, assistant physician, physician. Within the walls of one hospital he will usually have passed his entire career. "Preferment goes by old gradation, where each second stood heir to the first."[1] There are ten physicians and surgeons at St. Bartholomew's, every one of whom got his education there; eight physicians and surgeons at Guy's, of whom seven were students there; fifteen at the London, of whom two-thirds studied there; ten at University, of whom seven were students there. Of the five university chairs at Edinburgh, four are filled by former Edinburgh students. It does not follow that the exceptions—the one at Guy's, the five at the London, the three at University, the one at Edinburgh—were deliberately called to the posts they occupy. They, too, attained them by promotion,—only the point of departure was higher up. For the line begins at different points in different institutions. Below it or at its start, the hospital governors appoint nowadays, usually following the suggestions of the visiting staff.[2] Personal considerations weigh heavily.[3] But the line once

[1] *Othello*, Act I, sc. i, l. 36.

[2] In some hospitals, an election committee, on which the governors, the staff, and the honorary staff are represented, makes new appointments.

[3] Some hospitals, especially in the provinces, have no junior staff: there are only internes (recent graduates) and the visiting staff. This is the case at Sheffield, where, in consequence, the candidates for visiting posts canvass the governors for their votes. Moore, *The Dawn of the Health Age* (Edinburgh, 1910), gives the following account of the manner in which posts are filled in such instances:

"In what manner do we usually choose the best physician or surgeon when there is a vacancy on the staff of our great voluntary hospitals?

"By hard canvassing of the members of a lay committee, who themselves usually know nothing of the relative professional abilities of the rival candidates, but are swayed by the facts of the social standing and influence of the candidate or the candidate's friends.

"Fulsome testimonials as to the candidate's abilities are got together and printed by each candidate; these are circulated, along with verbal embellishments, by each candidate's social friends amongst the electors, who are nobbled to vote one way or another by pressure, cajoling, or beseeching.

"In the city of Liverpool, one large general hospital has a committee of over one thousand memstarted, filling of vacancies by promotion is a foregone conclusion unless distinct unfitness has developed. Advertising for applications is a survival, well understood to be an empty form. Promotion by seniority is surest of all at the last and most important advance to full staff membership, the step that carries with it a school lectureship. At University (London), the final step is automatic: the title of assistant physician or assistant surgeon lapses after seven years, the individual in question becoming physician or surgeon as a matter of course.

What has been the probable course of staff physicians or surgeons who have not throughout adhered to the hospital to which they attached themselves as students? Obviously, the more populous medical schools are unable to provide a continuous series of appointments for all their own graduates who aim at the consultant career, not even for all the promising ones among them. The smaller schools, on the other hand, may have too few candidates—or too few satisfactory candidates—to meet their own needs. A certain amount of migration therefore takes place immediately after graduation.[1] A student, finding no opening in his own hospital, catches at one of the lower rungs of the ladder somewhere else. He secures a resident appointment in the hospital or assists in a subordinate capacity in the medical school,—as demonstrator, or assistant demonstrator, of physiology, anatomy, or pathology. His foot is now on the ladder of the institution to which he has transferred himself. If faithful, he becomes increasingly valuable, and is rewarded for his school service by the position of medical or surgical registrar of the hospital, in which capacity he becomes responsible for the case records. His familiarity with cases will probably give him opportunity to teach on the clinical side. When openings occur, he is not likely to be passed over; his superiors on the staff, recognizing the claim established by assiduity, recommend him to the governors, who almost invariably concur. Careers of this type are common enough in the smaller London and provincial schools. Charing Cross, St. George's, Westminster, with an annual entry of a dozen or two, more or less, get the overflow of the big schools.[2] All the four St. George surgeons were educated there; but of its four physicians, one was a student at St. Mary's, one at St. Bartholomew's. None

bers, nearly all laymen, who elect the physicians and surgeons in this way. At a recent election several gentlemen who desired the position of surgeon to the hospital had their claims considered by this huge committee and the committee's friends in the city. Without making any criticisms on what the actual result of the election happened to be, it might be suggested that a method which would have worked equally well, and saved enormous trouble and expense, would have been that of putting all the names of the candidates in a hat and drawing one out." (Page 43.)

Physicians and surgeons so chosen become teachers in medical schools in virtue of their hospital posts. Similar methods of choice originally existed everywhere, but they are passing out. "Down to very recent times," says Holmes (*Life of Brodie*, p. 120), "the members of the staff were elected at St. George's by the votes of all the governors." He describes an election in 1843, when 321 governors attended: "The contest was hardly inferior in heat to that attending political elections. . . . The extent to which canvassing had been carried is shown by the names of the great personages persuaded to come down," etc. (Page 121.)

[1] The English would say "qualification" (for practice).

[2] Of eight physicians at Liverpool, five were London students, two Edinburgh, one Dublin; of eleven surgeons, three were Liverpool students. The percentage of men locally trained is likely henceforth to rise, for the provincial schools are now in more active competition with London and Edinburgh.

of the six physicians and surgeons of Westminster studied there. As juniors, the incomers are promptly naturalized in the hospital of their adoption, in which thereafter their rise proceeds according to the principles above explained. The line has begun later; but once begun, it does not easily break.

Naturalization at the top—outright importation of a member of the visiting staff, in other words—is so rare that the few instances in which it has occurred are universally cited as exceptions. In our time, Lister's career is unique, for he filled a regius professorship at both Glasgow and Edinburgh, and was called from the latter to the professorship of clinical surgery at King's College, London. Recently, the University of Manchester, controlling by contract one medical service in the Royal Infirmary, has ventured to invite the present holder from Newcastle. But the innovation was bitterly resented by the local men, alive to the danger lurking in such a precedent. The profession of the metropolis has hardly yet recovered from its astonishment when, a few months ago, space was made on the staff of the London Hospital for James Mackenzie, whose important researches on the heart had earned translation into foreign tongues, but not, up to that time, an opening for their author in any London school of medicine. Occasionally, hospitals reclaim their own: Sir Thomas Barlow, a student of University College, served on the staff of Charing Cross and the London before being appointed physician to University College Hospital; Sir Francis Champneys, a St. Bartholomew's man, won as obstetrician at St. George's the distinction which led to his present appointment at his own school. In Scotland, the universities "control" a limited number of services,[1] but their range of choice is local only. The historian of the University of Edinburgh notes that Laycock (1855–1876) was the first professor not educated in Scotland;[2] one of the present five university professors was educated at University College Hospital, London, and was subsequently assistant physician at St. Thomas's:[3] otherwise, the university has consistently resorted for its appointees to the local Extra-Mural School. There can be but one explanation of this phenomenon: hospital and school positions are points of business vantage which the local men propose to hold for their own benefit. They contend keenly among themselves for them until the jealous competition is suspended because danger from without forces them to join hands to resist invasion. Fortunately, a better spirit exists in the two ancient English universities, one of which, Oxford, has recently filled its regius professorship of medicine by calling Professor, now Sir William, Osler from Baltimore.[4]

[1] In Edinburgh, only by custom.

[2] Thomas Laycock, professor of medicine, 1855–1876. Laycock was not only an Englishman by birth, but had received none of his medical education in Scotland. Born in Yorkshire, he was a graduate of University College Medical School, London, and subsequently studied in Paris and Göttingen. In 1846, he became lecturer on medicine in the York Medical School, and was nine years later called by the town council to Edinburgh to succeed Alison in the chair of practical physiology. Grant: *Story of the University of Edinburgh*, vol. ii, p. 413.

[3] William Smith Greenfield, professor of pathology, also physician to the Royal Infirmary.

[4] So at Cambridge, the professors of medicine and surgery are outside men brought down by the university. They attempt only elementary teaching; the professors use the material in the hospitals for teaching, but do not themselves conduct the hospitals.

In general, however, it is fair—and necessary—to say that the laboratories and the clinics represent different and incongruous stages of development. The laboratories are educational institutions, the heads of which are called for merit; the hospitals are not as yet educational institutions, because neither in inferior nor superior posts do educational criteria govern appointment. Nor can medical education rise to a uniform modern plane until the methods of appointment now in vogue in the laboratories are applied to the staff of the teaching hospital.

Other defects in construction, equipment, and organization cannot be overlooked. The voluntary hospital has taken thought for administration, diet, nursing, pharmacy, beds, and out-patients. There, for the most part, it stops. Now a medical school requires laboratories at what may be called three different levels,—the general laboratories of physiology, pathology, and chemistry, in which the underlying sciences are taught and theoretical problems are under investigation; the routine clinical laboratories, in which the current ward work is done,—blood, urine, sputum, etc., examined and students trained in diagnostic routine; the research clinical laboratories, in which, varying with the inclination of the chief and his staff, obscure clinical questions are investigated, now from the chemical, now from the physiological, now from the bacteriological side. For example, the physiologist studies normal metabolism; the clinician gets thence the basis from which, in the research laboratories of the clinic, he can study the metabolism of the diabetic. It is, of course, not utterly impossible to carry on both sorts of investigation in one set of rooms. But the waste of time and energy where decent accommodations are lacking is, to say the least, a powerful deterrent. And, as a rule, where no facilities exist, little or no achievement is nowadays recorded.[1] How far the British medical school has acquired the fundamental laboratories, we have already seen.[2] Beyond this, the voluntary hospitals have made no uniform or marked progress. To each of the several wards of the Royal Infirmary, Edinburgh, clinical laboratories are attached, equipped for routine examinations and for the training of students in their technique, some of them possessing incubators and other appliances for the making of ordinary cultures; at Manchester, too, each hospital block has its own clinical laboratory.[3] This arrangement, so common on the Continent and so obviously conducive to economy of time and thoroughness of study, does not, however, generally obtain in Great Britain. A class-room is usually—not invariably—provided, where a junior physician conducts a course in clinical microscopy and pathology. The students serving clinical clerkships sometimes work there, sometimes on tables in the wards, sometimes in a small room elsewhere,—rarely, as at St. George's, in adequate and comfortable quarters. At Charing Cross,[4] the subject is taught in the room other-

[1] I do not mean to imply, however, that the more elaborate the facilities, the more brilliant the outcome.

[2] Chapter vi.

[3] But as the hospital has no vivisection license, only the most elementary microscopic work can be carried on there.

[4] As this report goes to press, it is reported that Charing Cross, following the example of St. George's and Westminster, has abandoned the teaching of the sciences.

wise occupied by physiology; at Middlesex, in that belonging to bacteriology. Facilities for the making of vaccines are common in London especially. Everywhere the correlation is excellent, for the student knows the clinical history of the case from which the material studied is derived; hospital and medical school are thus admirably involved with each other. But the arrangements are too frequently limited, and for that reason likely to reduce to the barest instrumental rôle the part that the laboratories play in the elucidation and management of clinical problems.

At the third level, that of clinical research, proper provision is almost altogether lacking. A recent gift has equipped for the first time a research laboratory in one of the pavilions of the Royal Infirmary at Edinburgh; but it forms a separate trust, administered by three physicians and their coöpted successors: the university is not a party in interest. The laboratory occupies a suite of three rooms, one equipped for obtaining graphic records, the second for radioscopy, the third for electro-cardiography. Space once required for the teaching of elementary chemistry and physics, before that instruction was wisely abandoned, has been converted at St. George's into research rooms under the direction of the lecturer in pathological chemistry. A cancer institute is connected with Middlesex Hospital. The prospect of clinical research in general is darkened by the prejudiced exclusion of animal experimentation. St. George's has been bold enough to obtain the requisite license; but the scientific spirit is not as yet sufficiently widespread in Great Britain to warrant the expectation that British hospitals generally will soon defy the obscurantist minority of which they have so long stood in dread.

While weak in laboratory equipment, I hasten to add that whatever devices tangibly contribute, or are credibly supposed to contribute, to direct therapeutics, the voluntary hospitals introduce as rapidly as their financial resources allow. For the care of patients they are therefore equipped in a progressive spirit. Great emulation is displayed in this matter: the various institutions vie with one another in operating-room installation, X-ray plants, colored-light baths, etc. But back of these improvements lies largely only the practical, empirically assimilative spirit: the critical, aggressive, inquiring initiative that itself invents or discovers may and does crop out in individuals, but it is not reckoned with in the structure and equipment of the hospitals themselves. "Hospitals have been built by men who had no idea whatever of their scientific needs," says Professor Osler.[1]

In their character of hostelries for the sick, the voluntary hospitals are practically without exception capacious enough to furnish the student with the necessary material. We shall shortly present this point statistically. Meanwhile, pursuing the consequences of intense preoccupation with charity, just as though that were more or less inconsistent with science or scientific education, the voluntary hospital goes but a short way in differentiating cases. As opposed to the high degree of specialization of topic necessarily brought about wherever investigation is prominent, — for research

[1] Address on "The Hospital Unit in University Work," in the *Lancet*, January 28, 1911.

and specialization go together,—the voluntary hospital makes about the same distinctions that are made by the family doctor. It has physicians, surgeons, obstetricians; construction accommodates itself to these fundamental distinctions,—rarely to anything more. Even where, as at St. Thomas's (London), separate buildings are found, they are not distinctly appropriated to specific purposes. Pediatrics and psychiatry are nowhere treated as specialties; dermatology not as yet invariably. Children commonly occupy beds scattered through the women's wards. Though separate wards be provided for them, as at St. Mary's, no separate department is constituted: a few children's beds are attached to each medical service. Neurology is similarly disposed of. University Hospital (London) takes no advantage of the presence of a distinguished neurologist on its staff. He gets no more psychiatric patients than his colleagues; like them, he is burdened with a miscellaneous medical routine. At King's, dermatology falls to a specialist; at Guy's and Charing Cross, to a visiting physician; there is a special hospital for skin diseases at Liverpool; at Manchester, apparently not even a special division in any of the infirmaries. At Edinburgh, however, separate pavilions of the Royal Infirmary are assigned to ophthalmology, otology, and dermatology.

There is a prevalent notion that breadth of training is in some way connected with the lack of specialization, though, as a matter of fact, the shoe is on the other foot. Thoroughness is dependent on differentiation. The German internist and the German pediatrist being two individuals, not one, each in the first place an excellently trained chemist, physiologist, and pathologist, are masters just because they are content to work thoroughly a limited field. Is the outlook of a student who learns internal medicine from the former and pediatrics from the latter really narrower than that of the student who learns both from one instructor? Excessive sweep may indicate vagueness rather than breadth.

We have spoken of the physicians, assistant physicians, house officers, etc., constituting the staff of the voluntary hospital. But of the functional organization of this body there is as yet hardly a trace. The German clinics are sharply differentiated, each an entity, conducted by a "team." Professor Osler has very happily designated this entity "the hospital unit."[1] The team composed of coöperating individuals, each charged with certain specific duties, all properly subordinated to the ultimate and appropriate purpose, forms the departmental staff. One may figure such a staff as pyramidal in structure: at the bottom, helpers; above them a set of laboratory aids or volunteers; next a series of assistants, each with definite responsibilities, all culminating in the professor, or, as he is aptly called in Germany, the director of the clinic. Each of the components in this organization is relatively permanent; by reason of the purposeful subordination of its parts to one another, the organization is so stable that promotions when earned do not upset its working. By way of contrast, the English hospital staff consists of isolated units, like a dotted line, perhaps two parallel

[1] In the address above referred to.

dotted lines: the top row represents the visiting physicians and visiting surgeons, some three to five of each, coequal in authority; the next row, equal in number of individuals, represents the assistant physicians and the assistant surgeons. No functional relation really subsists between the two. They are called a "firm,"—each physician or surgeon and his assistant,—but they do not form a team. Their activities are severed: the physician looks after the patients in bed; the assistant physician is physician to the out-patients. They do nothing together. When the physician is absent, the assistant physician substitutes, as "locum tenens;" when the senior returns, the junior slips back to his out-patients. In rare instances, the assistant physician has a few beds: at Middlesex, through the courtesy of his chief; at the London, in virtue of an arrangement, according to which, out of every five cases admitted, the chief gets four, the assistant one. Under such circumstances, they are still completely independent of each other; the physician's beds are *his*, as the assistant physician's are *his*. Each does practically all that is done for and with his particular charges. The laboratory men stand in the same instrumental relation to all members of the staff: they report objectively on specimens of sputum, urine, and blood to whoever sends them. Clerks and residents tarry for such brief periods—the former for three or four months, the latter for six—that they cannot enter as definite elements into an organized scheme. Under such circumstances, the hospital is hardly more favorable to intensive work than the ordinary private house.

The management of the British hospital is highly centralized. Its business affairs are intrusted to a single officer,—secretary or superintendent,—designated by the governors, and acting under their instructions; the management would seem to be highly efficient. At the London, St. Thomas's, Middlesex, this official is a layman; at Guy's, the Western (Glasgow), etc., a medical man. The relations between the executive officer and the hospital staff are now, as a rule, excellent. For their respective spheres are, as in Germany, sharply delimited. How effectually clean-cut demarcation of executive from medical responsibility eliminates friction is strikingly illustrated at Guy's, where Sir Cooper Perry is not only superintendent, but visiting physician. He holds and exercises his several functions rigidly apart: as visiting physician, he virtually ceases to be hospital superintendent; as hospital superintendent, he lays aside the character of medical man. His medical knowledge and experience may affect his course; but quâ superintendent, he does not deliberately rely on it. The same may be said of Dr. Donald Mackintosh, superintendent of the Western Infirmary at Glasgow. The title of "medical superintendent" is a misnomer in Great Britain as in Germany, if it is interpreted as in any wise qualifying the supremacy of the physicians and surgeons in their respective wards. There is no interference with them from any source whatsoever. Trouble has indeed arisen at times, when too busy consultants have slighted their hospital engagements. But friction due to meddling would be one thing, as friction due to neglect is quite another. The former is for all practical purposes unknown. A dietary and a pharmacopoeia are agreed on in advance;

departures are exceptional,—usually allowed, but liable to scrutiny. In general, then, Great Britain bears out the experience of the Continent, that sharp differentiation of function as between administration and medical oversight is conducive to efficiency and carries with it no countervailing peril, provided only the staff members hold definitely to their obligations.

In admitting patients, the voluntary hospital pays a certain deference to its supporters: subscribers have the right of recommendation. Thus, at St. Mary's, "annual subscribers of one guinea to the maternity fund may recommend three patients annually to that department; and so on in proportion to the amount of the subscription."[1] Nor is this privilege anywhere limited to maternity patients. Recommendation, however, is nowhere conclusive. For in the last resort, the hospital retains the right to refuse admission, if vacant beds are scarce, if the case lies outside the scope of the institution, or if out-patient treatment will suffice. I am assured that, though occasionally, in deference to requests, unsuitable cases may be taken in, the privilege has had little appreciable influence from the standpoint of teaching; for patients thus admitted are utilized like any other. The matter of admission is usually in the hands of resident medical and surgical officers; occasionally, as at St. George's, it is left to the staff, attending in rotation. This method, apparently once quite usual, has been generally discarded because it was discovered that one of the ways of making staff positions serve consultant prosperity was through the admission by the staff of the dependents of their patrons or those of their medical clients.[2] The servants of the well-to-do thus took precedence over the neighborhood poor.

We have now considered in Great Britain, as we did in Germany, the fashion in which the teaching hospitals are built and manned. Let us see how the facts brought out affect their threefold function, the care of the sick, research, teaching.

The brunt of the routine hospital work falls on the resident officers,—resident physicians and surgeons holding for terms running from one to three years, internes appointed for six months, medical and surgical registrars responsible mainly for the case records, and the nursing staff. While visiting physicians or surgeons may be had in any emergency, the regulations respecting their regular attendance vary. In many of the London hospitals, they attend only twice or thrice weekly, for two hours, more or less, on each occasion; but at St. Bartholomew's, some staff members attend four, others five days each week. In London, visits to the hospital are made in the afternoon; in the provinces and Scotland, in the morning. The hours are not always sacred; for Treves is mentioned as a striking instance of a surgeon who never permitted a private patient to interfere with his hospital engagements. In Scotland, attendance appears to be more frequent: at the Western Infirmary, Glasgow, the physicians are in daily attendance from nine to eleven or later. One must not infer from the

[1] *St. Mary's Hospital Report*, 1909, p. 33.

[2] "Taking in request cases from general practitioners" (private letter from the secretary of one of the metropolitan hospitals).

generally brief periods of attendance that patients are neglected. As a matter of fact, it is probable that nowhere else in Europe is the level of hospital comfort so high. The resident officers do not spare themselves; and the nursing is in the hands of a superior class of trained women. The continental observer, indeed, frankly admitting the excellence of the nursing, is apt to regard the English trained nurse as having usurped some of the staff physician's responsibility. Should this be true, it would prove but another consequence of voluntary organization. Where the staff is unpaid, promotion by seniority is their reward; the privilege of scanting their hours cannot be strictly denied to them; residents and nurses must then step into the breach, as occasion requires. It must have been long since obvious to the reader that to the second of the three essential functions, clinical and surgical research, the voluntary hospitals as now conducted are wholly unsuited. The absence of laboratory facilities, the prohibition of animal experimentation, the unorganized character of the staff, the lack of differentiation of material,—these conditions are all hostile. Research is encouraged only where material is concentrated and differentiated. Definiteness favors the formulation of problems and provides sufficient material for their investigation. And not only facilities, but reward and appreciation, are lacking. For scientific achievement has no sure consequences. The line of promotion will not be broken to take in outside talent. Fidelity is more profitable than originality. While the German assistant trains for his promotion, the English junior waits for his, not in idleness, to be sure, but in what for our purpose is almost as destructive,—in the perfunctory, even if assiduous, performance of miscellaneous school and hospital jobs. His spirit is crushed when, at forty or later, he gets into the wards. Clinical research is therefore occasional, precarious, and individual, not characteristic, systematic, and institutional.[1] And, it may be added, it cannot be otherwise where teaching-posts are viewed as pawns in a professional game, and hospitals are keenly alive only to claims for immediate medical and surgical relief.

The limitations by which medical education in Great Britain is hampered have now been candidly exposed. It is nevertheless true that in respect to the student, nowhere else in the world are conditions so favorable. In our discussion of Germany, we pointed out that its clinical instruction was overwhelmingly demonstrative; that the student saw and heard, but almost never did. Clinical education in England has completely avoided this wasteful error. It is primarily practical. It makes, indeed, the huge mistake of assuming that a more scientific attitude toward the problems of disease is in some occult way hostile to practicality; for it protests against the adoption of modern methods of investigation, as though practical teaching would be

[1] In some places, a good deal of haziness appears still to characterize the notion of clinical research. Applying for a government grant to encourage research in the Extra-Mural School of Edinburgh, the chairman of its governing body recently testified: "The research question is chiefly bound up with classes like physiology. It is not so much bound up with the ordinary practical classes such as medicine and surgery." *Report of Committee on Scottish Universities and Minutes of Evidence*, p. 64 (London, 1910).

in some inexplicable fashion endangered thereby. However that may be, the English are indubitably correct in holding that sound medical training requires free contact of the student with the actual manifestations of disease. It is the merit of English, and, as we shall also perceive, of French, medical education that the student learns the principles of medicine concurrently with the upbuilding of a veritable sense experience in the wards, and that he acquires the art of medicine by increasingly intimate and responsible participation in the ministrations of physician and surgeon. The great contribution of England and France to medical education is their unanswerable demonstration of the entire feasibility of the method of instruction which the end sought itself imposes. The British schools have another important achievement to their credit: they have proved that the most uncompromisingly sound and practical instruction can be furnished in hospitals privately supported and managed. It is impossible to exaggerate the importance of this fact. Medical education of the exacting type we have advocated appears on the face of the papers to be reduced to a choice between bankruptcy and compromise: the former horn of the dilemma threatens, if the medical school insists that the hospital should invariably constitute part of its own plant; the latter, if it tries to hit off a *modus vivendi* with a hospital not its own. Experience disposes of both fears. Germany shows that municipal hospitals can be just as satisfactory as state or university hospitals; Great Britain shows that private hospitals are improved by their utilization for educational purposes. The Germans still need to introduce student activity; but to this criticism the university hospital is open equally with the municipal. The British hospitals still need to adjust themselves to a new order of staff appointment. But it will be time enough to announce this as impossible after it has been unsuccessfully attempted.

On the teaching side, the point to lay hold of, then, is this: given the ancillary sciences, medical education is thenceforth essentially an "apprenticeship" in so far as it must be acquired through actual handling of material. It is, of course, something more too; unlike plumbing or carpentering, medicine is not mere handicraft; the practitioner of the medical art must grasp principles. And for two reasons: in the first place, the emergencies in which he will be called on to act are infinite in number and complexity. No amount of training will insure his having been drilled in the medical school to act in the precise set of circumstances he is liable to encounter: only comprehension of principles abundantly, but at best partially, illustrated can guide him in the novel environments in which he will be placed. A supple and resourceful mind trained in principles and intelligently experienced will alone avail in dealing with the inevitable surprises of medical practice. Again, the physician practises an art which changes from one day to the next. A literal practical apprenticeship imposes upon him the limitations of the moment. He must grasp principles, problems, and possibilities if he is to appropriate progress, if he is continuously to revise his methods and practices. The medical apprenticeship must therefore be shot through with ideas. Direct and continuous observation of disease must furnish the starting-point of discussion and reading, which illuminate, expand, and relate experience.

To the installation of the apprenticeship there are two preconditions: the unhampered freedom of the staff within the wards, and a sufficient supply of clinical material. Both conditions are universally met in Great Britain. Indeed, it may be laid down as axiomatic that wherever in Great Britain medical teaching is carried on, the staff is free and material is adequate; otherwise, the attempt to teach would not be made. I have already pointed out that hospital administration and medical care are sharply sundered. On this score no friction arises. Trouble may come from failure of the staff to respect their engagements, but while insistence on obedience to the hospital rules governing attendance may limit a physician's right to neglect his duty, it can hardly be regarded as a limitation upon his discretion within his wards. The hospital managers never interfere with the medical supremacy of the staff; nor do they annoy them with fussy regulations governing the admission of students to the wards. Students come and go informally, without let or hindrance. They feel their responsibility, for they are utilized as important cogs in the hospital machine. Very rarely,—at Birmingham, for example,—a rule limits the student's hours to the morning; but even there students come in the afternoon, nevertheless, and no objection is made. Thoroughly characteristic is the attitude of St. George's, where it is expressly stated that "students are permitted to enter the wards of the hospital at any hour except at meal times." These privileges are heartily, not grudgingly extended: no pretense is made that the hospital confers a favor on the school, for their essential interests are identical; nor that patients suffer, for they clearly gain; nor that subscribers resent the connection, for they have been educated to desire it.

The supply of clinical material needed for concrete individual instruction must needs be proportionately great. Two points are to be noted: the British medical school is situated only in populous towns; its enrolment is, excepting only Edinburgh, never excessively large.[1] The smallest English town containing a complete medical school is Newcastle-upon-Tyne, with 266,671 inhabitants; Sheffield has almost half a million, Birmingham over half a million, Liverpool and Manchester over 700,000 each. Cardiff, the seat of the only school in Wales, has a population of 182,280. The four Scottish schools are situated in towns ranging from 169,409 (Dundee) to 578,478 (Glasgow parish only); Edinburgh has 320,315. None of the British schools is handicapped by local poverty of material.

The teaching hospitals undertake, as a rule, to supply beds mainly for internal medicine, surgery, and gynecology. For these, the London schools run the gamut from the 200 beds of Charing Cross[2] and Westminster to 922 at the London: inter-

[1] The largest medical school in England is at Cambridge, a small town; but no effort at clinical teaching is made beyond a few general lectures. The Oxford and Cambridge students go elsewhere, usually to London, for their clinical training, as I have already pointed out.

[2] A few temporarily closed at the time of my visit on account of lack of funds.

vening come St. George's, St. Mary's, Middlesex, and University, each with something above 300; St. Thomas's with slightly under, and Guy's with slightly over, 600, and St. Bartholomew's with almost 700. The provincial schools at times are even more richly provided: the Royal Infirmary at Manchester contains 592 beds; the federated clinical school at Liverpool controls 1050 beds, that of Sheffield 427, the amount of material being absurdly out of proportion to the facilities for educational handling of it. Glasgow has access to some 1200 beds, — 600 in the Western Infirmary, where male students are concentrated, and 588 at the Royal Infirmary, where women students are sent. Aberdeen has a general hospital of over 200 beds; Dundee, one of over 300. Edinburgh, despite its 910 beds, is confronted by something of a problem, shortly to be considered. In general, it is clear that the schools run far below capacity in the matter of clinical teaching.[1]

In the distribution of material, surgery as a rule slightly preponderates, but medicine is amply represented. The following table exhibits the distribution of beds:

Hospital	*Medicine*	*Surgery*	*Gynecology*	*Children*	*Eye*	*Ear, Nose Throat*	*Skin*	*Private*
London	314	343	33	77	26	10	17	
St. Bartholomew's	236	315	32		25	20		
Guy's	236	279	24		37	10		27
St. Thomas's	180	232	30	34	25			36
St. Mary's	85	112	12	28	7	8	4	
Westminster	76	93	10	13				
Royal Infirmary (Manchester)	240	300	20					
Royal Infirmary (Edinburgh)	402	350	53		52	22	25	

The virtual capacity of some of the hospitals is considerably increased by the possession of convalescent homes, to which at the proper moment patients may be removed for recuperation: St. Bartholomew's Convalescent Hospital, at Swanley in Kent, accommodates 70 patients; that of St. George's, at Wimbledon, 100; that of the Western Infirmary (Glasgow), at Lanark, 42; that of the Royal Infirmary of Edinburgh, at Corstorphine, 100. The material in the wards can thus be kept in more rapid movement.

The open spaces in the above table are variously filled in. Contagious diseases — fevers, as they are called — are abundantly provided by the fever hospitals maintained by the municipalities, — in London, with an aggregate of over 7000 beds; mental diseases are found at insane asylums, the modern psychiatric clinic being as yet nowhere established; the out-patient departments supply an immense quantity of material in all the so-called specialties, the few beds occasionally devoted to them being thus largely supplemented. Hitherto obstetrics, also, has been in London an

[1] As a rule, no provision is made by English free hospitals for private pay patients; these are usually attended at their residences or in "nursing homes." Pay beds for patients of this description are found, however, at St. Thomas's and Guy's. Any physician or surgeon in consultant practice may have patients in them; the fees are arranged between patient and physician, — with that the hospital has no concern; nursing and maintenance cost 9 shillings a day at Guy's, 12 shillings a day at St. Thomas's. The number of beds thus available is small: some 27 at Guy's, 36 at St. Thomas's.

out-patient affair. In the provinces and Scotland, special lying-in hospitals exist, usually affiliated with the medical school. The Glasgow student, for instance, has access to a maternity of 108 beds. Under pressure from Oxford and Cambridge, the London hospitals are at this moment introducing in-patient obstetrical teaching, small wards being in process of creation for the purpose. Children's hospitals, with from 80 to 100 beds, are found at Liverpool and elsewhere.

The distribution of beds to the visiting staff varies somewhat: at Charing Cross, a staff officer controls 20 beds; at Westminster and St. Mary's, 30 odd; at Middlesex, 40 to 50; at the London, 60. At St. Bartholomew's, from 36 to 49 beds are allotted to a physician; 60 odd to a surgeon. At Manchester, the physician gets 35, the surgeon 61. Assistant physicians and assistant surgeons have, as a matter of right and generally as a matter of fact, no beds, though, as I have already mentioned, at Middlesex and elsewhere they may receive them through the courtesy of the superior, and at the London custom allots out of every five in-patients, four to the chief, one to his junior. At Manchester, an assistant physician may have from 4 to 8 beds; an assistant surgeon 3. At Edinburgh, the surgeons average 56 beds apiece, the physicians something over 40; the gynecologist has 27.

The service is everywhere continuous, broken only when the chief is on vacation, during which period the assistant substitutes. A peculiar—and decidedly bad—arrangement has, however, been introduced at Sheffield, where, instead of dividing the entire medical or surgical service between three individuals, each doing continuous duty in his own division, the three visiting physicians succeed each other, taking turns. During a physician's turn, all entering patients are his. When his period lapses, the incoming patients all belong to the succeeding physician; but the former officer continues to look after the patients who came to him during his term of duty. When they give out, he is without occupation until his turn comes round again. By this strange system he is heavily overworked at one time and under-occupied at another: meanwhile, as there is no bed that he can permanently call his own, continuity of interest or application is not to be expected.

In abundance and variety out-patient departments correspond closely with the hospitals to which they are attached, as the following table shows. Especially noticeable is the enormous number of casualties handled:

Institution	New Cases[1]	Medical	Surgical	Casualty[2]	Midwifery	Gynecology	Children	Orthopaedy	Eye	Ear, Nose, Throat	Skin
London	95,682	15,524	23,337	15,067	5,163	2,287		394	8,002	9,085	9,160
St. Bartholomew's[3]	130,289	63,513	46,685		1,141	1,601	678	743	4,007	5,289	3,321
Guy's	130,499	11,687	6,732	98,131	3,555			509	6,199	4,152	3,943
St. Mary's	52,011			25,195	630						
Middlesex	51,318			32,259	471						
University	52,709	4,572	2,815	35,945	1,312	903			2,140	1,852	1,537
St. Thomas's	83,728			61,323	1,377						
St. George's	41,627	7,080		28,759	257	488				948	601
Royal Infirmary, Manchester	33,714			7,631							
Royal Infirmary, Liverpool	27,852	3,465	10,538	3,764		511			1,679	2,107	867
Western Infirmary, Glasgow	29,254										
Royal Infirmary, Aberdeen	16,796										

[1] Each case counts once only. [2] Medical and surgical. [3] Casualty cases not separate.

Unlike the German medical student, the English student of medicine is treated like a schoolboy. A record of his class attendance is carefully kept; from time to time written tests are given in order to determine his standing. For this his immaturity and lack of thorough preliminary education are doubtless responsible. He hears a certain, steadily diminishing, number of lectures,—usually three times weekly in medicine, an equal number in surgery, and considerably less in midwifery, gynecology, and therapeutics. They are of two kinds: clinical and systematic. The former turn about a patient, and are analogous to the demonstrative clinics held in Germany. But they differ from the German lecture in their more directly practical and less scientific character: they are less stimulating than the German discourses bristling with ideas and problems and always conceived from the standpoint of scientific development. The didactic exposition kept up in Great Britain, though generally disbelieved in, does little more than expound a text-book. Students capable of reading a volume on the theory and practice of physic could assuredly dispense with these didactic lectures. Perhaps they are retained because the matriculation requirement does not as yet furnish a satisfactory guarantee. As a rule, they are given in rotation, the staff of three to five members dividing the field between them; but as the British consultant is only rarely an expert in a particular field, the divisions serve no purpose but convenience. At Edinburgh, instruction by lecture is more prominent than elsewhere. There I was authoritatively told that "the high quality of the Edinburgh man is due to the excellent quality of his systematic lecture training." My subsequent experience led me to regard this claim as an unconscious apology for certain conditions that hamper the university in its use of the Royal Infirmary. In general, it is hardly an exaggeration to say that the didactic lecture might drop out perhaps almost entirely without seriously crippling the instruction.

For the backbone of British clinical education is the actual and continuous participation of the student in the care of the sick. Armed with an introductory knowledge of the underlying sciences, students "come over" from the college building into the hospital, where they are first of all trained to obtain and to interpret physical signs.[1] The course lasts three months; but at the conclusion of a fortnight, "clerking" starts. At the London Hospital, for example, the class is so divided that six students are assigned to each "firm." The teaching unit consists there of physician, assistant physician, house physician, and half a dozen students: it has 60 beds to work with; there are as many such units as there are "firms." The routine begins with a practical exercise, in which the medical registrar[2] instructs the students in the systematic taking of notes,[3] whereupon the house physician escorts the group on its first ward walk, allotting the cases in rotation with a brief description by way of enabling the new clerk to take hold. As old cases leave and new ones come in, allotment in turn continues. Each clerk is responsible for a complete history and description of each of his cases, including the requisite microscopical examinations. He has all necessary freedom and facilities, entering the wards without ceremony and readily procuring such material as he may request. The house physician or the clinical pathologist conducts general courses in the clinical laboratory and lends special assistance in the difficulties and problems that the young clerk inevitably encounters. His notes on the case must show what he has done. He is compelled, therefore, to be definite in his statements. These notes, criticized by the medical registrar, revised, and completed, frequently form an essential part of the records of the case.

The house physician makes rounds daily with the clerks from 9.30 to noon. Two afternoons weekly the senior physician conducts the same group over the same ground. At the appointed hour, all clerks assemble,—at St. Thomas's, in the great rotunda, at St. Bartholomew's, in the ancient courtyard. On the appearance of their chiefs, the men form into small groups, and quickly disperse to their respective labors: the quiet of the long wards is not appreciably broken, for they move noiselessly from cot to cot, conversing in low tones over the patient under discussion. House physicians and clerks alike are subjected to a thorough "grilling" at the hands of an experienced consultant. Though conducted in a charming spirit, the confrontation is necessarily a severe trial. As each case is reached, the clerk responsible steps forward, reads his notes, and defends his findings, his proposed diagnosis and suggested treatment, in reply to the interrogations of the physician. The house physician is necessarily involved; the kindliness and informality with which the conference is conducted enable any student to take part in the examination of the patient, in the elucidation of the

[1] This course is variously designated as elementary medicine, practical medicine, or physical diagnosis.

[2] Who has charge of the case records; see page 193.

[3] Convenient printed directions for case-taking are furnished to each student.

diagnosis, in the suggestion of appropriate therapeutic measures. I witnessed, for example, the bedside work at St. Bartholomew's, where five clerks followed the visiting physician. He took up three heart cases in succession. Though one clerk reported in detail on each, every one of his fellows might, the patient's condition permitting, make a brief examination. For every case that the student himself reports, he sees four more demonstrated, and at such close range that more or less independent verification is frequently possible. When a case terminates fatally, the teaching group repairs as a unit to the dead-house to submit their entire procedure to the searching test of the autopsy table. This routine continues during two terms of three months each, differing only in so far as more difficult cases are assigned during the latter term.

The method outlined fills every requirement of sound and thorough teaching. The student observes the patient from all sides: he notes symptoms at the bedside, he examines secreta and excreta, he sees both sets of facts in the light of the case history; he watches progress and development, for he visits his patient daily from the time of admission to the day of dismissal; he can form his own conclusion, proposing whatsoever procedure his experience or reading suggests to him. In all these steps his faculties are in continuous and complete exercise, every activity germane to the occasion—observation, inference, diagnosis, treatment—being intimately and continuously correlated with every other. And all the while the welfare of patient and student are absolutely safeguarded, for the student's observations and suggestions are promptly checked up, criticized, and revised by his superiors in the wards and the laboratories. He has every inducement and opportunity to active and responsible exercise of his faculties under conditions that entirely deprive the opportunity of the peril of inexpert medication.

Substantially the same procedure is followed in surgery. Corresponding to the introductory exercises in physical diagnosis on the medical side there is a six weeks' preliminary training in surgical dressing in the out-patient department, designed to drill the student in applying bandages and splints, dressing cuts, etc., followed by a three months' practical course in elementary surgery, devoted to surgical diagnosis and the principles of aseptic and antiseptic procedure. Thenceforth the surgical teaching unit, composed of surgeon, assistant surgeon, house surgeon, and six students, enters upon a daily practical routine likewise lasting six months. The surgical registrar instructs in the taking of notes; the beds are allotted by the house surgeon in rotation. In the operations, which take place four times weekly,—senior and junior staff surgeons each operating on two days,—the "dresser," as he is now called, is, next to the house surgeon, first assistant in his own cases; he aids in their preparation, under strict oversight, of course. At the London, during three days of every fortnight he lives in the hospital, now assisting in the receiving room, later making ward rounds with the house surgeon, aiding in the application of dressings, the giving of anaesthetics, treatment of fractures, etc. On occasion of a bedside consultation between a physician and a surgeon, the students of both attend. Toward the close of his schooling, the student gets a course in operative work on the cadaver. Even though it be admitted that this last-named sort of surgical instruction is nowadays antiquated, operative courses on animals are impossible under the existing laws.

Midwifery is treated similarly: the student serves as in-patient clerk to the obstetric physicians for at least six weeks, during which period he takes histories, conducts pelvic examinations under the supervision of the resident obstetrician and obstetric registrar, and serves as second assistant at operations. Thereupon, for a fortnight, he goes on duty in the out-patient maternity,—day duty one week, night duty the next. Cases are assigned in rotation; on a clerk's first cases he is accompanied by the junior resident obstetrician; later, he acts alone, but under definite instructions as to seeking aid, if difficulties arise. Material is so plentiful that a student may easily procure from thirty to fifty cases, twenty being required. Recently, Cambridge and Oxford have stipulated that students entering for their medical degrees must have had also an in-patient obstetrical training. The provincial and Scottish schools have long provided for this. The London schools are just beginning to do so: 8 beds have been set aside at Guy's, 10 at Middlesex, 12 at St. Mary's, 8 at University, 9 at London, 20 at St. Thomas's.

The principles and methods above explained could be, if necessary, still further exemplified in the required clerkships in gynecology, ophthalmology, and "fevers," in the last of which a six weeks' clerkship must be served in one of the contagious disease hospitals maintained by the city. Optional clerkships are open in skin diseases, diseases of the ear, nose, and throat, and anaesthetics. Vaccination is compulsory.

English clinical education amounts, then, to a series of posts or appointments, each characterized by the active participation of the student incumbent. Though the little coteries thus formed are short-lived, their members are for the time being on a most intimate footing with one another. "The English clinical teacher," remarked one of the most distinguished of them, "is the teacher of his clerks." No matter who or how many attend his lectures, his pupils are specifically those with whom he talks at the bedside. An intense loyalty is highly characteristic. There is no migration; the student clings to the hospital of his original choice; and his personal attachment to his instructors is the corner-stone on which the consultant system securely reposes. The method transmits the prevailing type,—the "practical physician," as he is eulogistically called. But it would be equally effective in transmitting a higher and more modern type: it is not inherently limited to any particular kind of clinical training.

The posts open to the student vary somewhat from place to place. The appointments comprise in-patient and out-patient clerkships, in-patient and out-patient dresserships, clerkships in pathology, in clinical microscopy, and in each of the specialties. Over five hundred such appointments are annually made at the London Hospital; elsewhere in proportion. Senior students are eligible to appointment as house physician, house surgeon, junior obstetric assistant; to the posts next higher, salaries are usually attached—those of resident medical or surgical officer, the registrarships, casualty officers, clinical assistants, curator, etc. The period of tenure of clerks and dressers varies slightly, being four months at University, St. Mary's, and Westminster, three at London, St. Bartholomew's, Guy's, and St. George's. To some extent, posts are optional, and so far elective opportunities are provided for the more energetic and capable. But it must be noted that these additional opportunities do not differ in intensive quality from the required appointments. A student may, in other words, fill more posts than he is bound to fill; but they are all alike of limited, though fortunately concrete, character: optional chances to forge far ahead along some line of awakened interest are nowhere furnished as part of the system.

The number of beds assigned per student—and, it may fairly be added, the theory of the subject—varies with the prevailing relation between the size of the hospital and the size of the school. The small schools regard a large average of beds per student as highly desirable, for, it is argued, the student thus sees a considerable variety; the large schools aver that a smaller average of beds per student conduces to thoroughness of study. On the whole, it would appear that the student (who has, it must be remembered, other things to do) can occupy himself fully with 5 beds or thereabouts; he has 6 at Middlesex, from 8 to 10 at St. George's and St. Mary's, from 5 to 10 at the Royal Free, 10 at Westminster, 5 at the Royal Infirmary (Manchester), 16 at Sheffield. At the Royal Infirmary (Liverpool), the registrar assigns each student 5 or 6, and looks after the rest himself; a surgeon at the Northern (Liverpool) has four dressers with 8 beds apiece. Not every patient is educationally valuable. Fortunately, material is, as a rule, so plentiful that the useless can be freely discarded.

At Liverpool and Sheffield, it is indeed so plentiful that the school is lost in its clinical facilities. An indefinite supply of material is of infinite importance to graduate workers or clinical investigators, for, according to the doctrine of chances, the probability of finding precisely the cases they want, and in sufficient variety, increases directly with the number of beds on which they can draw. But for the training of students a certain degree of concentration is requisite: the student is largely formed by the atmosphere and organization in which he acquires his clinical instruction. A medical school with a small body of students needs, in the first place, not many hospitals, but a hospital: a hospital sufficiently commodious, compactly organized, well equipped, competently conducted, and permeated with educational ideals. In London, one never escapes the school atmosphere while in the hospital. The student has insinuated himself into its every nook and cranny. The atmosphere is redolent of study and teaching. The Liverpool and Sheffield clinical schools are, on the contrary, a congeries of hospitals containing beds in point of number out of all proportion to the size of the student body: 75 to 100 Liverpool students are lost in wards containing 1000 patients; 20 to 30 Sheffield boys make no impression on the 600 beds nominally constituting the clinical school. Teaching is incidental, not dominant. The clerk and the dresser lead an unreal life, for they are too casual to become calculated, responsible, and uniform parts of the hospital mechanism.

How large a school can be conducted on the London plan? That appears to be entirely a matter of organization. There are practically 240 medical beds at Guy's: we may suppose five services of approximately 50 beds each. Each service would accommodate 10 clerks with five beds apiece: 50 medical clerks could then simultaneously serve a four months' in-patient clerkship. In the course of the year,—vacations being at this stage abolished, as Professor Osler suggests,[1]—150 students would pass through the medical wards. If, now, the other services were similarly in operation and the out-patient departments properly utilized, it is obvious that the larger London hospitals, properly equipped and manned, could carry much larger schools than now exist there without derogation to the practical character of the training offered.

Whether because of its detachment from the service of the chief or because of the relative abundance of in-patient material, the out-patient department plays only a secondary rôle in medical instruction. It cannot be regularly employed—as in Germany—as a reservoir, from which the chief can draw what the beds do not supply, or supply too scantily, but is utilized for the specialties, for tutorial teaching, and for the introductory courses in physical diagnosis, bandaging, etc. On the surgical side, a required out-patient dressership always precedes the in-patient dressership. On the medical side, it is held that out-patients are necessarily too summarily disposed of to serve the formation of good working habits. During the formative period, the student keeps to the wards.[2] The out-patient department nevertheless gets its day, for it is the arena in which, just preceding examinations, the tutors put the prospective candidates through their paces. I witnessed an out-patient clinic of this kind at Manchester; five or six students attended. The material was abundant; from it the physician in charge selected the interesting material for distribution to the students, who, retiring to adjoining rooms, went over their cases, while he attended to those left on his hands. Reassembling later, the clerks described their own patients and watched those exhibited by the others. But for the depressing foretaste of the impending examination and the teacher's cautions to avoid this pitfall or that, in his anxious interest for the student's success, the exercise was most valuable. At St. Bartholomew's, I attended an admirable clinic in surgical diagnosis, serving the same purpose; the St. Bartholomew student gets nine months' practical experience as surgical dresser,—three months each in out-patient dressing, casualty dressing, in-patient dressing. Five assistant surgeons have charge of the out-patients, each with eight dressers. Daily, one assistant surgeon withdraws from active work in the out-patient department in order to conduct the class I am about to describe.[3] It con-

[1] "Hospitals have no vacations, and the old-time vacations should be done away with, and the school year divided into quarters, during which the work would proceed continuously." *Lancet*, January 28, 1911, p. 213. Most of the London schools already have clerkships all the year round.

[2] At Manchester, however, out-patient clerking for three months is accepted in lieu of in-patient clerking for the same length of time. The mixture of new clerks with students getting ready for examination that results is hardly to be commended.

[3] In this way the group passes through the hands of all five assistant surgeons.

sisted on this occasion of some thirty to forty men; on one side sat the eight dressers, one or another of whom had seen the patients to be exhibited, for they were ambulant cases, reserved for subsequent clinical use; on the other were ranged the candidates preparing for an imminent examination, who alone actively participated in the instruction. Cases were assigned to them in succession. While one student was engaged in arriving at a diagnosis, the instructor carried on an informal quiz and discussion with the rest, a discussion that was interrupted to allow the dresser to present his findings. That the English clerk and dresser are at this stage much more ready and resourceful than the German *Praktikant* is not for a moment to be doubted. In the present instance, the material was so selected as to require diagnostic differentiation between superficially similar conditions: two abdominal cases analogous in appearance were exhibited; the physical examination disclosed decidedly discrepant conditions, as the students themselves promptly made out; a series of scrotal swellings — six in number — were shown, and the young dressers displayed considerable acumen in discriminating between them. No more convincing evidence of the importance of abundant material and the proper use to make of it at the right moment in the student's development could be given. Nor do the schools depend merely on the indigent poor themselves in this matter: practitioners throughout the city have been taught to avail themselves of the hospital facilities in the making of a diagnosis. They send their patients with an explanatory note and receive a courteous and explicit reply, representing the combined efforts of students and instructor. As the several patients withdraw, their respective dressers have the responsibility of explaining to them the directions that they are to carry out. Characteristically, too, the moment this arduous exercise was completed, the instructor hurried off to the museum to drill a fellowship class in surgical pathology!

For, evidently, on the clinical as on the laboratory side, the schools train their guns so as to insure the passing of their men; tutorial classes lead them up to the cannon's mouth. The spoon-feeding of the student, the concentration of responsibility for a mechanically adequate equipment upon the tutors, are undoubtedly important factors in bringing about the general sterility of English medicine: for the ideal constantly held up is schoolboy mastery of the known, for which unstimulating achievement the individual most concerned invariably leans heavily upon, and thus sacrifices, somebody else. At St. Bartholomew's, for example, three separate tutorial classes are formed yearly in medicine for Conjoint men; advanced classes are held for those who go in for the M.B. degree of Oxford, Cambridge, and London; still other special arrangements are made by way of coaching those preparing for the M.D. degree of London University. At the same school special and separate provision is made for four different examinations in operative surgery: courses are given twice a year for the benefit of Conjoint men, three times a year for the university bachelors, twice a year for candidates for the services, twice a year for candidates for fellowships and higher degrees. Similar arrangements exist in midwifery, etc. As a written paper forms part of the various examinations, didactic drill claims a share in the exercise. For fear some student may stray from his proper fold, "police" officers, charged with their special supervision, are detailed. Meanwhile, the men to whom these depressing tutorial duties are assigned are those whom we have previously observed, busy in the discharge of heavy and varied routine tasks: the guardian of the London University candidates is at St. George's an assistant surgeon, at St. Bartholomew's an assistant physician, at the London Hospital a demonstrator of morbid anatomy and instructor in elementary medicine; the Oxford tutor at St. Bartholomew's is an assistant physician, who is also chemical pathologist and physician to the hospital for sick children; at Guy's, he is assistant physician, medical drill-master, demonstrator of morbid anatomy, and lecturer in forensic medicine. Some of the designations in question might be more or less nominal without invalidating criticism directed against the educational ideal implied. The motive power is not the interest or possibilities of the subject, but dread of the examiner. Where has this latter ever been a productive power?

In Scotland, the clerkship is less prominent and thoroughgoing than south of the Tweed. At both Edinburgh and Glasgow, the student selects and pays his own clinical teachers. At Edinburgh, part of the staff of the Royal Infirmary is appointed by the university, part by the infirmary governors,—the latter offering instruction as the Extra-Mural School.[1] But as the five wards belonging to the university are obviously inadequate, the university recognizes all teaching carried on within the infirmary. The students therefore distribute themselves at will, betraying a natural predilection for teachers who are also examiners. Great inequalities result. Of 310 students in the medical wards last year, one physician had 120, another 10; the others ranged from 20 to 60 apiece. There were 210 surgical dressers: one surgeon had 60; another 10; the others between 30 and 50. At Glasgow, one surgeon, an examiner, had a class of 60; in another division of 126 beds there were 3 students. Under such circumstances, members of the more popular classes get only demonstrative instruction from the chief. The intimacy and regularity characteristic of the London relationship are quite out of the question. Beds may be assigned, of course. In the sparsely attended wards, clerking and dressing may be regularly carried on. Elsewhere a rotary system has been introduced: the beds are distributed in succession to two students at a time, as far as they reach; when a patient is discharged, the two clerks to whom he belonged go off duty; the in-coming patient goes to two students next in line. How many cases fall to any one student during a clerkship depends on the rate at which the patients move. The notes of the student are criticized by the tutor; the extent of accountability to the chief at the bedside diminishes *pari passu* as the class expands. In gynecology alone has a sound organization been effected in Edinburgh.

[1] The regulations of the Conjoint Board in London permit a candidate for its qualification to spend not more than six months at a hospital not connected with a medical school, counting the same as required hospital practice, thus also recognizing extra-mural clinical work. Not exceeding one per cent of those seeking the Conjoint Board qualification avail themselves of this privilege.

There, 60 beds are divided into two wards of 30 apiece. Twelve students at a time are admitted into each: they take the cases in succession, making the necessary examinations and keeping up the records. Limitation and organization thus favor each other.

The obstacles to clinical reorganization in Scotland are not everywhere the same. In Glasgow, where material abounds, the difficulty appears to reside largely in the proprietary interest of the staff in the student fees; fortunately, a recent ordinance gives the university the right to decide the number of students that any lecturer may accept for ward work. In Edinburgh, where clinical material is, as compared with the size of the student body, relatively scarce, making economical organization all the more important, the situation is aggravated by the separate existence of the Extra-Mural School. Professor Woodhead calculates that even if a uniform distribution were procured, surgical dressers would now obtain on the average less than two beds apiece. As the university lacks control, it happens that material is wasted in one service while dressers are wasted in another. In defense of this arrangement, it is still urged that local competition provides a useful stimulus.[1] This may well be doubted: the legitimate rivalries of science and education are now fought out on a higher and broader plane. Edinburgh is no longer a closed arena in which university and extra-mural instructors can compete for students on the basis of the success of their respective candidates before examining boards. New standards prevail; and the entries are world-wide, —coming from the provincial universities, from London, from the scientific centres of the Continent. Under such circumstances, the local ranks must be brought together. Whatever hampers the university in its choice of men, its organization of instruction, its distribution of students, is but a reminder of an era whose accounts are already settled.[2] Moreover, it must not be forgotten that while division between the Extra-Mural School and the university adds nothing to the total resources of the Edinburgh school, it subtracts a good deal; that is, Edinburgh actually has less to offer the student now than it could offer if its resources were pooled. For scientific medicine asks not only for courses, but for correlation of courses: instruction must converge upon the patient from every possible avenue of approach,—laboratory and bedside. As long as the laboratories of pathology and clinical pathology remain outside the university, neither treatment nor teaching can be uniformly and thoroughly correlated.

Out-patient teaching conditions vary considerably as between Glasgow and Edinburgh. At the former, a most attractive series of little amphitheatres has been provided. Once more, students are not distributed. About twenty students might be conveniently handled. When the numbers go higher, they are advised to scatter; but

[1] "In Scotland we have gone in so much for the extra-mural teaching from the point of view of competition: one would be very sorry if that were in any way impaired." *Report of Committee on Scottish Universities and Minutes of Evidence*, p. 54 (822), London, 1910.

[2] See *Report of Committee on Scottish Universities and Minutes of Evidence* (London, 1910), particularly the extremely lucid and convincing analysis contained in the note by Professor G. Sims Woodhead on "Clinical Teaching in the Medical Schools" (*Report*, pp. 12-16).

they are persuaded or not, as they please. In any event, theatre teaching is essentially demonstrative, even though students are called down into the arena episodically, as are the German *Praktikanten*. Edinburgh utilizes six public dispensaries, situated in different parts of the city. Students are required to take out three, and may take out six, months in dispensary and district patient work. Some twenty students, reporting two afternoons weekly, are attached to each dispensary. Cases are assigned in rotation to two students, who make the examination and report later to the physician in charge. Between them a consultation thereupon takes place.

From the preceding account, it is clear that, in the conception of the essentials of clinical discipline, British traditions are thoroughly sound. In all that pertains to the relation of the student to the hospital, the English model deserves to be universally copied. On the other hand, it is perhaps equally clear that complete modernization of spirit and ideal, which nothing in the method itself in the least opposes, is everywhere hindered by proprietary survivals. The original advantage of the English situation — the close association of teaching with the hospital — proves for the time being an obstacle to better things. It is so good that its merits are alleged as a sufficient excuse for not attempting anything markedly better. One cannot too emphatically insist that the modernization of British medical education does not contemplate the relinquishment of any of its valuable features; indeed, they are to be pressed upon the attention of educational reformers in other countries. The curable defects of the English situation refuse meanwhile to be explained away: as compared with the German university department, the English medical school is unproductive and the English medical student is handled like a schoolboy learning a trade. Both conditions will be remedied by one course of action; for when teachers of medicine are university professors, they will insist upon a higher grade of preliminary training. Thereupon the student can be trusted with larger individual freedom, can be tempted by genuine opportunities to seek his own larger development, — an enterprise congenial to the spirit with which the university professors of medicine and surgery will have inspired their departments.

From this point of view, a highly interesting effort now making in London will repay close watching. On its face, London would appear to be marked out as the Mecca of English-speaking medical students. It is, as a matter of fact, almost wholly ignored by them. The colonial continues to go to Edinburgh, where more students than are now to be found in all London work in the wards of one hospital, for their purposes about the size of St. Bartholomew's; transatlantic English-speaking students resort to Germany. Nay, worse, the metropolis is even losing its insular preeminence. Not only does it fail to attract students over seas; its magnetic force is unequal to drawing them from adjacent counties. While Berlin, Vienna, and Munich show annual increases in student enrolment, the British capital is headed downhill.

How is this astonishing phenomenon to be accounted for? The current explanations cite the rise of the provincial universities: Liverpool, Leeds, and Manchester students, who formerly resorted to the London hospitals, now stay at home, on the ground, probably well taken, that they do just as well there. One hears, too, much of the so-called "grievance of the London student," previously adverted to, — doubtless a factor of some influence. The medical student of the Scotch and the provincial universities obtains a degree at the close of his course. The London hospital schools confer no degrees; to attain that, London students must qualify at London University, where the matriculation requirements are higher, the course a little longer, and the professional examinations somewhat more severe. If this diagnosis is correct, the remedy, even though difficult of application, is sufficiently obvious. In one way or another, degrees can be made inevitable and cheaper. A solution thus arrived at would be, however, of no general significance. It would establish peace in London and might even restore the fallen fortunes of some of the hospital schools. But to what purpose? One cannot rid one's self of the notion that the British metropolis has a rôle of larger importance to play.

The University of London discharges two functions: it examines for degrees and diplomas students whose teaching it does not furnish or control; it federates, without internally directing, a variety of institutions of incongruous character. Two of them, King's and University Colleges, are genuine academic institutions; but the medical schools, in which we are interested, are mere private ventures, affiliated, but not transformed by the nominal university relationship.

With the general problem involved in the conversion of an unwieldy and ineffective congeries of institutions into a genuine university we have no concern. It is, however, necessary to point out that external work, whether carried on at a distance according to official syllabi, or carried on close at hand in recognized institutions whose spirit and aims are after recognition precisely what they were before, is not university work in the sense in which the term has been used in these pages. Extension work may be ever so useful, — it does not constitute a university; the holding of examinations may within limits be expedient, — it does not constitute a university. In fact, all work not carried on by teachers selected by the university or a university college of uncompromising academic character, amid conditions determined by the university, with ends set up by the university, is external work, even though those carrying it on may sit in the university senate. In this essential sense the medical schools are "external." Proprietary schools in the first place, these schools remain what they were, — after inclusion in the university as before.[1] As far as medical education is concerned, the University of London is only a circumference, a line drawn about what is,

[1] "They have never shown a real desire to coöperate (with the university). . . . Their relationship to the university, which is something new, sits lightly on them. . . . They are not primarily educational bodies. Their interest is only in a secondary degree educational. The hospital committees want a medical school to help to run the hospital and the interest of the staff is professional."

"There is a very great deal of jealousy between the different schools; not so much educational rivalry as jealousy. There is a tendency — I will not say more — to use various devices to catch students. . . . A teacher obtains through his own students a great deal of consultative work." Principal Headlam in appendix to *First Report of Royal Commission on University Education in London*, p. 88 (London, 1910).

a generously drawn line at that,—not an active embodiment of definite scientific and educational ideals. For university education is a concept of precise and exacting significance: it implies a faculty of homogeneous composition busily engaged in investigation as well as teaching, facilities adequate to both, and a competent student body. Other forms of science teaching have their uses and should go on. But as such they do not represent efforts of university grade.

If, then, a solution is desired which will render the medical department of London University a factor in medical progress, and draw students and investigators to London, as they are attracted to Berlin and Heidelberg, then it is impossible to compromise with the proprietary interest. A nominal solution which continues to dub every hospital whose staff chooses to teach medicine a clinical department of London University will not avail. For the provincial and for the foreigner, that net will be spread in vain. Experience not confined to Great Britain proves that clinical teaching incidentally offered by a hospital staff cannot be of university quality. An adjustment which segregates and develops the underlying branches will also be ineffective. Certain subjects can thus undoubtedly be theoretically developed—anatomy, physiology, and pharmacology. But by setting up one ideal for some of the laboratory branches and a different ideal for the clinical, the functional unity of the medical school is destroyed: the student's fundamental training would be a shot into the air. Unsatisfactory is still another suggestion, that "recognizing" all existing schools, the university should leaven them by appointing professors of medicine and surgery to be distributed among them : a university medical clinic, for example, would be established at Guy's, a surgical clinic at St. George's, etc. The plan is recommended on the ground that a similar arrangement is in operation at Paris,—where, however, as our next chapter will show, it signally fails to produce medical training or medical investigation of modern quality. And for obvious reasons. The detached clinician or surgeon is an individual deprived of the stimulus and collaboration which he acquires from the proximity of the other members of a properly organized school. In the hospital where a university medical clinic is to be domiciled, physics, chemistry, physiology, surgery, pathology, would still remain of non-university complexion: in such an environment, medical research will not thrive, nor will the undergraduate's medical training be of academic grade. Finally, great store is set by subsidies: let workers but enjoy subsidies, it is urged, and the present London medical schools will produce. Vain expectation! Productivity is, in the first place, a matter of leaders. No arrangement which perpetuates in the highest places sterile, even if accomplished and skilful, practitioners will be fertile, no matter how liberal the support of scholars, fellows, and assistants. Undoubtedly, such workers can be thus procured in great numbers; but they will busy themselves on the fringes of recent achievements, rather than blaze fresh paths through undiscovered country. Fellowships, indeed, have—in limited numbers—their value; they can facilitate the establishment of a "school." But they have no power of original creation. It is idle to assemble youthful workers by means of moderate stipends unless a source of ideas is first secured. The sole indispensable requisite is the leadership of a fertile intellect under conditions in which it is actually in command.

There is, therefore, no substitute for the creation of a school in which laboratory and clinics of the same university texture will be intimately interwoven, unless the substitute is merely an imperfect beginning which is expected to grow into the organization just described. If, however, the full step could be taken at once, the university would select a single hospital to start with. It is plainly impossible to organize a dozen or even several complete university medical schools: neither funds, nor teachers, nor students are procurable. As the secondary schools still supply properly trained students in small number, the London experiment is under no constraint to essay the grand scale. Let us suppose that London University, reorganized on its teaching side, cut adrift the hospital schools, creating its own hospital or retaining for the present a single hospital,—the London, or Guy's, or St. Bartholomew's,—in which a proper arrangement gave it unfettered scope, and where, on the basis of well-developed fundamental laboratories, it would organize a clinical department of university quality. Or more simply still: let us suppose that, detaching the affiliated hospital schools, London University should by subvention enable one of its constituent colleges, viz., University College, to complete its medical plant on an academic basis by making with University Hospital a contract arrangement giving University College the right to designate and organize its hospital staff. While not one of the largest of the metropolitan hospitals, University Hospital is probably large enough to accommodate all London medical students of university quality; and completeness of academic control is at this moment too important in London to be sacrificed for mere quantity of material, provided the material obtainable on an academic basis is adequate to its purpose. University Hospital would, at the moment, perhaps answer the needs of London medical students of university grade; it would have to serve no other. For, on the lines proposed, the education of mixed university and non-university students would cease. The present is an auspicious moment to take this step, because England is just on the threshold of secondary school expansion; the experiment can still be made on a small scale. The university would appoint to staff membership, in whatever hospital it procures, men determined to make scientific careers in medicine and surgery, and seeking only academic rewards. The notion that clinical medicine and surgery are so devoid of inherent interest that only huge pecuniary and social prizes can attach men to their pursuit will be promptly exploded: these prizes are obstacles only. Once create the conditions in which scientific achievement is possible, and scientists will enter just as certainly as the worldly will leave.[1] Is it too much to

[1] A staff thus appointed could not do all the clinical teaching of the medical school without exhausting itself in routine,—the very thing to be avoided. They could be assisted by men engaged in practice, especially in the out-patient teaching, in giving courses in physical diagnosis, etc. Objection to the university scheme, on the ground that investigating professors will not be interested in teaching students about trifling but common ailments, will thus be avoided.

believe that university clinicians and surgeons will equal the achievements of British physiologists and chemists? that well-trained English boys would find difficulty of matriculation and graduation an incentive rather than a deterrent? that English-speaking students from the New World would then seek the clinical opportunities of the English-speaking metropolis of the Old? Pending the development of the enterprise, the hospital schools would continue their present useful work. As secondary education improved, the hospital schools would lose ground, the university school would be more severely taxed. Ultimately, the non-university medical school will become both superfluous and anomalous, for all intending physicians will have procured a secondary education adequate to the needs of university professional training. At that moment, London would face the present situation of Berlin and Vienna, endeavoring to teach a thousand students with facilities meant for five hundred. There is, however, no reason why London should be forced into the Berlin or Paris mould. Whenever students become numerous enough to need another set of laboratories and clinics, another hospital could be taken over or established by the university with another set of fundamental laboratories. Each plant should be complete in itself. Several complete schools, none exceeding perhaps 600 students, would be greatly preferable to one school with reluctantly duplicated departments. Two or three departments, each complete, would thus be in operation,—a novelty which might not impossibly prove the solution of the problem of effectively educating without recourse to mass teaching the throngs that normally seek the opportunities of a metropolis. The other hospitals would in time cease to be undergraduate schools; for they can remain undergraduate schools only if the personal interest of the staff is preferred to the progress of medical science and the better training of medical students. It does not follow, however, that they will not be open to students. Wherever progressive men achieve, thither students—old, if not young—will find their way. A useful, nay, even a distinguished career in the training of specialists and in the cultivation of postgraduate studies, is open extra-murally to every hospital in direct ratio to the individual merits of its staff members.

CHAPTER IX

CLINICAL INSTRUCTION: FRANCE

Having now discussed at considerable length clinical instruction under outright university conditions in Germany and essentially non-university conditions in Great Britain, we may deal somewhat more briefly with clinical teaching in France. It adds to our previous survey little that is new. Externally, the university relationship appears to obtain; on closer inspection, decided limitations are discovered. The teaching method resembles that employed in England.

Externally, I have said, the university relationship appears to obtain; for all the complete French medical schools are university departments. But the French universities neither own nor control the hospitals in which their clinical training is given. The French hospitals are municipal charities, the expression of the ardent humanitarian convictions of the Revolution, from which they date. On terms which will shortly be stated, the Assistance publique—the bureau charged with the management of hospitals, retreats, etc.—makes over to the university designated wards in scattered hospitals, of which wards the university professors become ex-officio clinical heads, and the contents of which they use for clinical instruction in such wise as their judgment approves. In this fashion, clinical facilities are procured by all French universities. If I speak of Paris specifically, it is to be understood that, though the scale varies, the same principle everywhere obtains.

Thirty-one hospitals, aggregating 15,584 beds, are comprehended in the Assistance publique of Paris.[1] They are classified as general hospitals, for the reception of medical and surgical patients, of which the more important are Hôtel Dieu, La Pitié, Necker, Cochin, Laennec, and La Charité, with 607, 696, 475, 779, 336, and 651 beds, respectively; and special hospitals of definitely prescribed scope: St. Louis, a vast establishment of 1335 beds, limited to cutaneous diseases; Broca, 256 beds, for venereal diseases of women; Tarnier, an obstetrical clinic of 206 beds; Enfants Malades, a pediatric establishment of 704 beds; Trousseau,—likewise for children,—365 beds, etc. Originally, all were huge barracks, sometimes, like Hôtel Dieu, of imposing external appearance, but designed for the accommodation of the maximum number of sick. In recent years, a systematic reconstruction has been undertaken for the express purpose of meeting modern conditions. In the new wards of Cochin, for example, pavilion construction has been adapted. Each pavilion contains two wards, leading from a central building, of which one floor is devoted to administration, the second to laboratories; the pavilion forms a complete working unit of modern type, each ward service being in direct connection with the laboratories appropriate thereto. Since 1886, when the first laboratories were installed by private gift, marked pro-

[1] Adding orphan asylums, etc., the total reaches 30,000 beds.

gress in procuring proper equipment has been made: in 1907, twenty-nine research laboratories of one kind or another were to be found in the Paris hospitals; four radiographic services, eleven for electro-therapeutics; eight laboratories had been set up by the university for its medical faculty. The pathological department is usually a dead-house, autopsies being made by internes. In the provinces, the provision is in general inferior.[1]

In France, hospital administration is bureaucratic to the last degree. The central administrator of the vast Parisian system sits at No. 3 Avenue Victoria. His authority and duty are well-nigh incredible. Rigidly and minutely prescribed rules govern all hospitals alike. Beyond the mechanical routine thus provided, no step, however trivial, can be taken without the express consent of the Director of the Assistance publique. He has indeed a representative in each hospital; but the representative possesses no authority whatsoever. He is an organ of transmission only; he cannot expend a franc, cannot dismiss an intoxicated servant, cannot authorize the most urgently needed repairs. Before a broken window can be mended, five distinct steps must be taken: the local representative must inform the director-general; thereupon the latter details an inspector to report; the inspector makes his investigation; the architect submits an estimate; the director-general gives the necessary authorization. Neither the hospital as a whole nor any service therein possesses the least measure of autonomy. Between administration and medical staff there is no friction because there is no intercourse. Physicians and surgeons are indeed supreme in the wards; but they have the supremacy of total isolation. They resign themselves to such conditions as they find. If improvements come—they come. Clearly, non-interference may take either of two forms: it may represent functional coöperation or supplementation, as in Germany; or it may represent non-intercourse, as in France. Nor are communications the less completely broken in France because the most scrupulous politeness is mutually observed.

The personnel of the Paris hospital consists of physicians, retiring on the basis of age at sixty-five,[2] surgeons and obstetricians retiring at sixty-two; internes, appointed for four years, externes named for two years, but eligible for reappointment for a third, fourth, fifth, or even sixth year; laboratory chiefs, etc. Each physician and surgeon thus possesses certain subordinates who assist in the conduct of his service. Every professor—not every hospital physician or surgeon—has besides a chief of clinic, an assistant selected by examination and holding his post for three years. Nevertheless, the chief and his aids do not form a functional staff in the German sense. A "team," the members of which participate in realizing through specialized and differentiated efforts a large ultimate object, can be organized only where a controlling mind having certain ends in view selects the required agents on the basis of their specific

[1] "Structure administrative des hôpitaux en France et à l'Étranger," by Dr. Léon Archambault, in *Congrès des Practiciens*, part ii, pp. 5-38 (Paris, 1910).

[2] But clinical professors retire at seventy.

fitness therefor. The several agents may cherish individual purposes as well; but they must first of all enter the larger scheme. In the French hospital, physician and surgeon have no voice in the selection of their subordinates,—internes,[1] who form a salaried resident staff; externes, who are usually unpaid assistants in the wards and out-patient departments, laboratory heads, etc. All alike are selected by competitive examinations,—"le concours," as it is called. Nor are examinations framed after conference with the chief with a view to eliciting ability or training of varying and specialized types; they follow a general pattern drawn up by no one knows who and conscientiously adhered to, year after year, by the Assistance publique. Of candidates for the externeship there are required an oral test in anatomy and an oral test in elementary pathology or minor surgery; candidates are allowed five minutes to think, and immediately thereafter five minutes to talk; the tinkle of a bell starts, and five minutes later breaks off, the reflective process. The entire ordeal lasts exactly twenty minutes. Obviously, the candidate must have his wits about him and his knowledge within easy reach. In most cases, he has been dexterously coached by those who have previously succeeded, thus acquiring considerable skill in neatly disposing of any likely topic in the period allowed. As all subsequent promotion depends on success in the concours for the externat, it is highly important to note the disposition which the initial competition fosters. For none but the 300 who annually win the externeship are eligible to compete for the 50 interneships yearly vacated; and a hospital career open only on these terms must in fact, if not actually in law, precede subsequent competitive efforts to become *agrégé* and then professor. The examination for the interneships differs from that for the externat only in elaborateness; it includes a two-hour written examination in anatomy and pathology and an oral examination in the same subjects, the candidate being accorded ten minutes to reflect and an equal period to answer.[2] Neither examination involves practical tests; one prepares for both in the library rather than in the laboratory or at the bedside. Subordinates thus selected make up the minor staff. Thus, the personal touch and the individual adjustment needed to constitute a "team" are obviously lacking: the former might arise in the course of the lengthy association fortunately provided for by the terms of the several appointments; as to the latter, only accident will introduce into a service an externe or interne possessing the precise qualities which at a particular juncture the chief might especially desire. For the hospital staff—whether university or non-university—have no voice whatever at any stage in these appointments. They are made by the Assistance publique;[3] and the internes, arranged in the

[1] Internes are paid on a rising scale: 600 francs, the first year; 700 francs, the second; 800 francs, the third; 1000 francs, the fourth. The hospital lodges some of them; the others receive an indemnity of 600 francs.

[2] "Dix minutes pour développer la question, après dix minutes de réflexion." Prévost: *Carnet de l'Etudiant en Médecine*, p. 16 (Paris, 1905).

[3] "L'internat et l'externat des hôpitaux de Paris ne relèvent pas de la Faculté de médecine, mais de l'administration générale de l'Assistance publique." Prévost: *Guide-Programme des Études médicales*, p. [illegible] (Paris, 1911).

order of their examination grades, select the chief of service to whom they propose to attach themselves. But the interne chooses his chief,—not the reverse. Meanwhile, whatever the merits or demerits of the method of appointment, the appointees enjoy unrivaled opportunities as far as facilities are at hand. The French interne serves a protracted period amid conditions in which a dull man must improve, and a keen man can find, every possible opportunity in the wards, the laboratory, and the dead-house.

Competitive examination—more highly elaborated, to be sure, but always attributing inordinate importance to fluent command of accepted doctrine—selects also the ranking appointees, hospital physicians, surgeons, etc., even those who may simultaneously be *agrégés* in the university.

As to the *agrégés*, an additional word of explanation is necessary. The *agrégés*—of whom there are forty-six—are practically assistant professors in the university. They are in active service, attached to one or the other chairs—both scientific and clinical—of the medical faculty for periods of nine years. Selected by competitive examination, to which all legally qualified physicians are admitted, candidates submit their published papers, write an off-hand essay, and deliver a lecture for the preparation of which only a few hours have been allowed. The various subjects are so grouped that the candidate is liable to attack from any quarter of a very extensive field,—pathology, therapeutics, internal medicine, and legal medicine forming, for example, a single division. Quite independently of this examination, which makes the winner a university lecturer, an *agrégé* may also, like any other qualified practitioner, win in competition a hospital post, and in virtue thereof be empowered by the university to give its students clinical instruction, as will shortly appear.

The advisability of appointment to any post on the basis of examinations depends rather on the dangers to be avoided than on the advantages to be gained. Examination—above all, written examination—is not calculated to disclose peculiar fitness or unusual quality. Informal search is in general the more effective method of selection. Unfortunately, where numerous appointments must be made, machinery that costs less time and energy must be employed; moreover, in any case, personal factors ought to be eliminated by the conditions surrounding the choice. For examinations, it may at least be said that they rule out the conspicuously unfit and exclude the cruder forms of personal partiality. For this reason the civil service, as indeed any service requiring correct methodical performance within narrowly circumscribed bounds, can be thus most satisfactorily recruited. Nay, more, the negative virtues of the examination are convertible into positive benefits by the more or less complete substitution of practical for written features. On this principle it may be laid down as indisputable that examination is the safest way to fill minor hospital posts.

But hospital physicians and surgeons are not nowadays employed to render correct methodical performance within narrowly circumscribed bounds. They bear enormous responsibility, wield enormous power over life and death, and practically monopolize enormous opportunity, for theirs is a monopoly of the clinical material on which medical and surgical progress depends. In merely excluding anything worse than mediocrity, the concours is practically "damned with faint praise;" for an effective method of selection must be calculated to lay hold of positive qualities of high order. The forceful personality may not be expressly excluded by being compelled to win opportunity by passing examinations; but he is unwittingly penalized, when the conditions are such that patient mediocrity may fare just as well, or better.

Such being the general hospital situation at Paris,[1] how is it affected by the necessity of providing clinical facilities for the medical faculty of the university?

In the general hospitals of Paris there are close to seventy medical services. The Assistance publique assigns four of these to the university, one each at Hôtel Dieu, Beaujon, St. Antoine, and Laennec. Surgical services are somewhat less than half as numerous as medical; of these, also, the university controls four, one each at Hôtel Dieu, La Charité, La Pitié, and Necker. In the same fashion, obstetrical clinics are assigned to the university at Baudelocque and Tarnier; a pediatric service at the Hôpital des Enfants Malades, one in cutaneous diseases at St. Louis, in gynecology at Broca, in urology at Necker. A sum total of eighteen dispersed services constitutes the immediate clinical facilities of the university.[2] Of the huge out-patient departments, found in all the hospitals, no systematic teaching use is made.

For the eighteen hospital services above named, the university selects the heads among those who have previously won an agrégéship in concours. To the appointment of university professors from a field thus artificially narrowed, there is rather greater objection than is to be urged against the practice in general. In appointing hospital physicians, the municipality may need to be artificially protected by an examination against political influences, but as it is hardly conceivable that the university would in any event do worse than mediocrity, selection of professors, subject to a previous concours, would seem to lack even negative recommendation. Examination does not, of course, exclude ability: Charcot, Marie, and Widal, to name only comparatively recent examples, passed through the meshes of the sieve. Nay, more, so strongly competitive a system tends to select vigorous, even if conventional, intellects and to keep them at a high state of tension. It does at least require that the

[1] What is true of Paris hospitals holds in all the large towns of France: in all alike, hospital appointments are made by competitive examination.

[2] On a small scale, the same arrangement is made at Lille, where one of the two university professors of medicine has a clinic at St. Sauveur, the other at La Charité; and at Lyons, where at Hôtel Dieu, the university controls two medical services out of eight and three surgical services out of seven; besides, at the Charité, the university controls one of two obstetrical services, and at St. Pothin, one of two dermatological services. The hospitals at Lyons adjoin each other, lying almost directly across the Rhone from the university; they can be reached by crossing a bridge in about ten minutes. This separation, however, divides the department into two non-communicating halves. The amount of clinical material accessible is very large; Hôtel Dieu contains 1100 beds, the Charité an equal number, St. Pothin 1000. The crowded condition of the wards of Hôtel Dieu interferes seriously with bedside teaching. A new hospital of modern design is about to be built, replacing the antiquated, though stately structure; in this it is hoped that all the university clinics may eventually be consolidated.

winner shall be learned. For this reason, the written or oral test in vogue in France is less inimical to eminence than the unwritten social scrutiny in vogue in England. For an able man who would be utterly impatient of a club code might turn aside from productive tasks long enough to prime himself for a competition for which, in his heart, he entertains no respect: six months' industrious reading will assuredly not wreck him. The objection to the concours is not, therefore, that it directly prohibits the best, but rather that it attaches no particular importance to it. It does not deliberately seek out the forceful; it is not adapted to doing so. On the contrary, it calls for vigorous and unremitting exercise of the mental powers within the circumference of the already known. It produces finished, ready, and fluent physicians, admirably skilful and well informed. But it has no talisman with which to discover and to honor unconventional or unique capacity; nor can it profit by a surprise. Now in education as elsewhere, mere conservation requires no special care; everywhere psychological habit, the established order, and vested interest make for conservation, in the realm of ideas quite as much as in the realm of practice. Progress meanwhile depends on aggressive and resolute endeavor. Not that the creative personality despises the accomplished fact; it simply does not suffice him. Having taken it up, he pushes beyond it. While, then, the modern university as an important engine of social progress demands initiative, the concours is more apt to award the palm to learned than to forceful men. The members of the jury are already well advanced in years; they have strong corporate feelings; they are not apt to break up the homogeneousness of their own body. The French system is efficient in conserving. Genius develops early; the French give no free or independent opportunity till late. By that time, fertility and idealism may have disappeared or abated. As faculty vacancies are filled singly, the new *agrégé*, already in middle life, is more likely to absorb than to transform the prevailing complexion of the body he enters. No outsider — minister, rector, or chancellor — can at a crucial moment intervene to "break up adhesions." The series of examinations which began at the externat tends thus to develop a pure strain from which all qualities not directly making for examinability are progressively eliminated.

In actual operation, the concours is capable of proving rather worse than its own theory. "Calling" does not necessarily exclude favoritism. A German faculty suggests three names to the minister; in the making of these nominations, an influential clique may conceivably be governed by personal considerations; the minister may even become a party to the transaction. Instances have indeed occurred in which personal preferences have dictated choice. But frequent episodes of this kind are most improbable. The fortunes of the entire institution depend on the strength of the teaching body; its prestige is damaged when a single chair is weakly tenanted. In any case, the "call" cannot sail under false colors: the scientific world knows when a prominent man has been passed over on account of Semitic origin, — as invariably happens in Germany, — or because of unorthodox scientific or political views. The concours may, however, conceal an injustice: for under the guise of an impersonal competition, it may decree superiority to the disciple who, as *agrégé* more fortunate than brilliant, attached himself betimes to the winning professional patron. The extent to which personal preference determines the outcome of the concours cannot be accurately stated. Certain it is that the closed system, by which the professoriate is restricted to *agrégés*, in the selection of whom complete impersonality is incredibly difficult, results in occasional choices and occasional failures objectively more or less inexplicable. Failure to coincide with native estimate is, of course, no proof of collusion; but when general scientific opinion is nonplussed, the argument against the concours is appreciably strengthened. Quite regardless of the facts, however, the easy allegation of partiality is a serious objection to the entire system.

The universities choose their clinical professors exclusively from the local profession. As the professors continue to engage in practice, the university appointment is sought and valued partly, perhaps largely, because of the professional prestige it carries. France and England are one in this respect. The more outspoken French clinicians are under no illusions on this score. "There are no professors of medicine and surgery, strictly speaking, in France," remarked an *agrégé* in surgery to me; "practice and science are implacable enemies." In consequence, only under highly exceptional circumstances is importation thinkable. And this is equally true of Paris and of the provinces. Paris, knowing itself to be the maelstrom to which ability hurries, presumes that it has nothing to gain by seeking appointees elsewhere. It might be supposed that first-rate men rebuffed there would seek larger and more tranquil opportunity in the provincial universities. Not so. The savant cannot rest until his gold has been minted in the overshadowing capital; and the provinces indirectly assist in strengthening its supremacy, for they assume that the best left to them is superior to such talent as might confess itself unable to make a respectable Paris career.

The bearing of these conditions on research is unmistakable. Excessive centralization is fatal to the existence of many competing foci, reacting upon and reinforcing one another. At Paris itself, the newly constructed clinics are admirably adapted to research; but the organization of the clinic is precarious and scientific recognition uncertain. Endeavor is therefore single-handed. There, as less commonly in the provinces, brilliant individual contributions are made on both laboratory and clinical sides. In this respect France and Great Britain resemble each other strongly. But except at the Pasteur Institute, arrangements do not conduce to the exhaustive working out of involved lines of inquiry by a clinical experimenter, his staff, and his pupils. Moreover, the scientific branches in the university are entirely detached from the clinical: between physiologist, pathologist, and clinical teachers, there is therefore no intercourse, no collaboration, no mutual suggestiveness. Even on the clinical side, compactness is lacking. The university physician is stranded in one hospital, the surgeon in another. The most vigorous and fertile minds may triumph over adverse conditions, but at a loss, nevertheless. French like English research is therefore individual, not institutional; incidental, rather than systematic.

This fact is admitted in France, as it is admitted in Great Britain. It is interesting to observe that in both countries the same suggestion has been made as to dealing with it. Their present methods, it is urged, "turn out good practical doctors;" in respect to that, let us leave well enough alone. Research is a separate problem, soluble by the endowment of separate professorships or fellowships, with such facilities as they may require. Intending practitioners need receive only the lower discipline; those with loftier ideals may train in the higher.[1] The objections to this reversion to a state of things which had to be suppressed by statute[2] need not be fully restated at this point. The physician must not be merely trained to know and to do certain things to-day; medicine is progressing so rapidly that intelligence, skill, and interest must insure his participation in its farther advance. The defects of medical education in Great Britain and France are at bottom due to failure to recognize the practical bearings of this principle. The proposal in question is not the outcome of disinterested educational study; it is rather a compromise that will avoid the necessity of disturbing the present order.

The Paris school contains several thousand students. As clinical study is obligatory from the second year, and optional even during the first, almost the entire student body must be accommodated in the hospitals. The intelligent attitude of the authorities in freely opening the wards to teaching has made this seemingly impossible feat entirely feasible: so much so that the strength of the Paris school lies, as we shall observe, in its ward teaching. For this the eighteen university services plainly do not suffice; they are therefore supplemented by "recognition" of hospital physicians and surgeons, to whom, by arrangement, the medical faculty assigns students in groups of twenty. This is accomplished with less disorganization than would be anticipated, because of the double position of many of the *agrégés*. I have already noted the fact that to every chair an *agrégé* is attached. The *agrégé*, as such, has no hospital status; but no objection is made when the *agrégé* to the chairs of physiology, anatomy, medicine, or what not enters a concours for a non-university hospital post. If successful, he becomes physician, let us say, to Hôtel Dieu or Trousseau. As *agrégé* he continues to lecture on some branch to medical students at the Faculté;[3] but, in addition, he can now undertake clinical teaching in his wards. For the Assistance publique, with notable wisdom, has, as I have previously mentioned, thrown open all the wards of the Paris hospitals to teaching: every physician or surgeon may, if he so chooses, be followed on his ward rounds. In the same fashion, hospital posts may be won by professors holding non-clinical chairs in the medical faculty. The univer-

[1] Georges Hayem: "De la Reforme des Études Médicales," in *La Presse Médicale*, November 26, 1910.

[2] See chapter i.

[3] The building of the medical department in the Rue de l'École de Médecine, where lectures are given, is known as the "Faculté;" across the street is the newer building, in which practical courses are held, called "l'École pratique."

sity is thus in position to increase its clinical facilities. It recognizes the clinical teaching offered by holders of non-clinical medical chairs, by *agrégés*, and by *ex-agrégés* who have won hospital posts. Chauffard, professor of the history of medicine, has, as such, no clinic; but he holds through successful competition a medical service at Cochin: to him, therefore, a group of *stagiaires* are sent. Marfan, professor of therapeutics, Pierre Marie, professor of pathological anatomy, instruct *stagiaires*, as tenants of hospital, not university, posts, the former at the Hôpital des Enfants Malades, the latter at Bicêtre. As *agrégé*, Tuffier merely lectured at the Faculté on the principles of surgery; his term had expired before he won his present gynecological service at Beaujon: as hospital chief without university position, he receives the quota of students that during his university incumbency he could not have handled. Thirty clinics are thus recognized by way of supplementing the clinical resources of the university.

The clinical instruction consists of lectures, ward work, and special courses. The lectures are of two varieties,—systematic lectures or conferences, given at the Faculté; clinical lectures, given in the theatres of the several hospitals. The lectures at the Faculté always take place in the afternoon, the entire morning being left free for hospital work. While lecturing and reading count heavily toward the examination,[1] Paris medical teaching prides itself altogether on its practical scope in the hospital wards. To that, therefore, we may profitably confine our attention.

The Paris hospitals, widely scattered through the city, are practically all considerably removed from the university buildings in the Rue de l'École de Médecine. As ward rounds are made daily during the morning hours, all the teaching at the Faculté, of whatever kind, takes place in the afternoon: dissecting, theoretical lecturing, and special courses are alike remanded to the latter half of the day. Even first-year students, of whom hospital attendance is not required, are encouraged to participate to the extent of attaching themselves informally to ward groups, thus acquiring at the outset the preponderant interest in clinical experience which the French scheme tends to foster.[2] Of the remaining three years, two are passed in the general medical and surgical wards, the third is apportioned between obstetrics, mental diseases, diseases of the eye, and those of the urinary tract.

The instruction begins and ends with the exhibition, examination, and observation of cases; and that, too, without preliminaries. There are no introductory or special classes in physical diagnosis or clinical microscopy. To acquire facility with the stethoscope, less resorted to than in England and Germany, to learn percussion and palpation, the student is left to his own devices; in laryngology, rhinology, and otology alone are practical courses in technique conducted at the Faculté.

The theory upon which the French school proceeds is extremely simple: one goes

[1] "Aucun de ceux qui sont reçus vétérinaires ne peut se vanter, comme quelques-uns de nos étudiants, d'avoir obtenu un diplôme sans avoir vu un seul malade." Professor Georges Hayem in *La Presse Médicale*, November 26, 1910, p. 891.

[2] I met a first-year student "clerking" in a gynecological clinic.

into the water to learn to swim. To know and to differentiate disease, the physician must first of all see it, watch it, and handle it; if he sees and watches it intelligently, continuously, abundantly, sheer iteration will both build up and differentiate an experience. The method can be applied only where clinical material is exuberantly plentiful and easily handled,—everywhere the case in France, and especially so, perhaps, in Paris. The French student in general, the Paris student in particular, enjoys practically unrestricted opportunity to gain thorough familiarity with the concrete manifestations of disease.

Take, for example, Chauffard's service at Cochin, consisting of 120 beds, 60 occupied by acute medical, 60 by tuberculous, cases. Twenty *stagiaires* daily accompany him through the wards. In the first place, he is an admirable teacher: quick, incisive, clear, and charmingly courteous,—qualities common, even if not universal, among French teachers. Like his English analogue, the French student is entirely at his ease. The utmost informality prevails. Each *stagiaire* has obtained by allotment two or three beds. The appointment runs for four months, during which period he has unobstructed access to his cases; he is expected to see them daily before the arrival of the chief. At the foot of each cot hangs a card bearing the names of the externe and of the student in charge of the patient; they are, to employ the English phraseology, the "clerks," to whom, on reaching the case, the physician turns at once for a statement covering history, physical examination, etc. In his two-hour clinic, the instructor will exhaustively discuss some three or four cases, quizzing *stagiaire*, externe, and interne — and in this order — before himself supplementing, correcting, or summing up. At this particular clinic, bedside observation and laboratory findings are closely correlated; the discussion continually expounds the one in the light of the other. Cases terminating fatally are followed to the autopsy, performed by a hospital interne. Meanwhile, students other than those in personal charge of a case — sometimes students not officially belonging to the group —and visitors are free to interpolate questions or suggestions, and, the condition of the patient permitting, to verify by examination points of especial note. Not infrequently, the informality of procedure results in gathering a throng so large that many hear, rather than see, what is going on; the assigned *stagiaires*, however, are entitled to places immediately beside the bed.

At a bedside clinic at the Hôtel Dieu, for example, I counted forty witnesses, not an unusual number; hardly half of them could see the patient. Fortunately, positions shift as the group moves: the student who remained out of range at one bed gets the inside track at the next —an obvious improvement over the amphitheatre demonstration, where respective advantage or disadvantage of position is permanent, and where professor and student necessarily occupy a formal attitude toward each other. A skilful teacher, standing at the bedside, gradually works the student into increasingly active participation and consultation. The patients — here as everywhere in Europe — rather enjoy the exercise than otherwise, for it makes a break in their monotonous day. Indeed, the quick and clear responses characteristic of the nimblewitted Parisian patients contribute largely to the success of bedside instruction. Their ready apprehension contrasts strikingly with the dull wit one not infrequently encounters in countries where the peasant answers "yes" or "no" indifferently, and will, if sharply interrogated, obligingly replace the one by the other.

Gynecological teaching may be illustrated by Tuffier's work at Beaujon. Tuffier is in daily attendance. Twice weekly he operates, on which occasions he urges his students to visit elsewhere rather than to waste their time in looking at what they cannot see; they are thus enabled to observe at other hospitals eminent teachers whom they cannot otherwise get to know. On the other three week days, Tuffier makes ward rounds with his *stagiaires*. His instruction is practically an exercise in diagnosis. To each student three or four beds have been allotted. By nine o'clock, or shortly after, the clerks are at work on their cases. Interne, externe, and students have their subject-matter well in hand, when about ten o'clock the professor enters. The *stagiaire* reads his report first, giving a detailed history and describing such indications as he has made out. As he proceeds, externe or interne may interpose a word here and there, and the professor keeps up a running fire of comment and criticism. While three responsible individuals are thus cross-examined, the others get something more than close-range demonstrative instruction; their attention is called to features that have been overlooked, and now one, now another, is permitted to substantiate an assertion. A small blackboard is in constant requisition: Tuffier draws as he expounds, to show size and relation of the parts in question, or to depict a proposed operation; and all muddiness is summarily expelled from discussion by requiring the students or assistants to show what they mean through the same medium. Accountability is thus at once swift and concrete. As the indications to be observed are usually prominent and the logical processes involved relatively simple, the exercise is admirably adapted to discipline in sound diagnostic habit.

By its clinical teaching, as above described, the French medical school stands or falls; for the most part, French medical training begins and ends at the bedside. Special practical courses are indeed offered; but a brief description of them will show the propriety of characterizing French medical instruction as essentially clinical on conservative lines. For example, three *agrégés*, the chief and two assistants, give a course of thirty lessons in practical obstetrics at Tarnier; a course of twenty-three exercises in normal and pathological nutrition is announced at Laennec; twenty-eight lessons in infant surgery at the Hôpital des Enfants Malades; twelve lessons in gynecology to a class limited to twelve members at Broca. These are doubtless all excellent opportunities; but the fees are high—from fifty to one hundred francs each—and the accommodations limited. Within the hospital, too, efforts are made to round out the chief's instruction. Once or twice weekly, the laboratory chief attached to the division conducts a practical course or conference. Nothing, however, could better confirm my position as to the character of French medical training than just such practical courses.

Following a medical clinic at Hôtel Dieu, for example, a weekly conference "in which the students will be individually trained"[1] is conducted by the laboratory head, his assistant, and an interne. The program of topics includes the examination of tuberculous sputum, bacteriological diagnosis of diphtheria, typhoid, and pneumonia, blood examination, sero-diagnosis, etc. The clinical group, with the attending physician, repairs in a body—thirty-three strong—to the Amphitheatre Bichat, where for some thirty minutes the instructor discusses the topic of the day. Culture tubes are passed round, rough drawings of bacilli made on the blackboard; thereupon, the students approach the demonstration table, where slides already spread lie alongside appropriate staining fluids: each student immerses a slide in the stain and looks at the result through one of the two microscopes provided. The "individual training" extends no further. The extremely elementary character of the proceeding shows how little practical discipline could have preceded.

The fact is, that at no stage do the laboratories get a fair chance. From the start they compete with the fascinations of the wards: the student is hardly likely to infer from his practically immediate induction into the hospital that clinical observation presupposes a technique elsewhere and previously acquired. Having once contracted the bedside habit, he can hardly put it off in order to apply other methods, for the practical mastery of which such inadequate provisions exist. Unless the underlying sciences have initially received treatment commensurate with their diagnostic and therapeutic importance, they will fail to play even an instrumental rôle in education and practice.

Meanwhile, the merits of clinical teaching in France are indisputably great and fundamental. If medical teaching has to choose between books and wards, or between laboratories and wards, France has exercised its option wisely. Keen, resourceful practitioners can be formed on the rich sustenance furnished by the Paris clinics. Nay, more, let the medical school possess whatever else it may, without varied clinical experience and lucid clinical exposition, doctors cannot be properly educated at all.

The choice which France thus exercises, scientific medicine, however, refuses to recognize as valid or even possible. Fifty years ago, perhaps less than that, it urges, medicine, empirical at best, had to be acquired in the rough-and-ready school of experience. So, essentially, it is still acquired, when *stagiaires* learn by the methods of imitation, trial, and error, etc. But scientific medicine has set its premises in order. Analytic study has worked out the basis on which applied medicine rests; while bedside observation has lost nothing of value, new tools have been forged, new technique devised, by which order, intelligence, increased certainty, and something more nearly approaching completeness have been rendered attainable. Of this movement, French clinical training takes no adequate account.

And for this reason, already adverted to: aside from the difficulties ascribable to numbers, the French medical school is nowhere conceived as an organic whole. Be-

[1] "Les élèves seront exercés individuellement"—from the posted bulletin.

tween the fundamental branches presented at the Faculté and the clinical branches presented in dispersed clinics throughout the city, there is no intercourse whatsoever. The anatomist and the physiologist, on the one hand, the physician and surgeon, on the other, work oblivious of each other. Nay, more, the several university services of medicine and surgery are lost in the various hospitals in which they are situated. Suggestion, interplay, correlation, equally essential for both teaching and research, are absolutely out of the question. The modernization of the French school requires the integration of laboratories and clinics: not otherwise can they react upon each other. To bring this about, the university must concentrate its clinics so as completely to control certain hospitals, in connection with which departments of pathology, pharmacology, and physiology may be established. The underlying sciences will thus attain the importance they deserve. Paris is frequently cited in proof of the feasibility of a medical school living upon dispersed privileges. It rather furnishes irrefutable demonstration that no medical school so composed can achieve an organic or modern character.

CHAPTER X

CURRICULUM AND EXAMINATIONS: GERMANY

We have now completed the separate consideration of the several subjects pursued in the medical school. How are they combined to form a course of study?

The activities of the medical faculty in Germany extend far beyond what is immediately teachable; what is immediately teachable vastly exceeds what is immediately teachable to any one student. The teaching range of the medical school is therefore necessarily a selection from its total range; the studies pursued by a particular student are necessarily a selection from the contents of its teaching scheme. This could not be otherwise: new divisions of subject-matter are in continuous process of formation, whether by segmentation or original creation. As physiology and pathology split off from anatomy, so bio-chemistry is just now splitting off from physiology; bacteriology is growing into a department of hygiene. On the clinical side, pediatrics, psychiatry, and dermatology are rapidly attaining the independence already enjoyed by medicine, surgery, and ophthalmology. Not less pronounced is the differentiation taking place within each department: anatomy, once content with a dissecting-room, now presents three facets,—morphology, histology, embryology,—within which certain subdivisions, for example, neurology, cutting across all three, form an *imperium in imperio.* Precisely how far such subdivision shall be carried depends less on the topics themselves than on the angle from which a particular individual proposes to approach them. A given topic might fall with equal appropriateness within the department of bacteriology or within that of experimental medicine. At any moment a highly theoretical line of investigation may prove of such direct practical importance as to require transposition from the research to the teaching side. In vain do we cherish the opinion that at least the foundations are secure, that only the superstructure will require occasional remodeling. So fundamental a distinction as is now recognized between anatomy and physiology may prove to have served its purpose. Not inconceivably, the more explicit recognition of a functional point of view in the study of structure, and the development of a more devoted race of clinical instructors, may lead to a redistribution, in the course of which what now goes by the name of "medical physiology" may, as the diplomats say, be benevolently assimilated by anatomy and the clinics:[1] in that case, space could be won for bio-chemistry and experimental physiology within the undergraduate curriculum. It is an inevitable consequence of research that no point of view, no logical arrangement of subject-matter, claims anything more than provisional importance: the validity of a specific standpoint depends on its capacity to develop new vistas, any one of which may supersede the standpoint from which it was opened up. The subject-matter of the medical curriculum covers,

[1] Such a proposition has already been made by Jacques Loeb: *Anatomical Record*, vol. v, No. 6, pp. 306-308.

then, a continuously increasing range, within which no particular form of organization can be either sacred or long lived. No two medical schools of modern type can possibly coincide. On the basis of an agreement as to what is currently held to be fundamental and indispensable, they diverge rapidly and considerably; and diverge they must as long as modern science rejects ultimate and orthodox points of view and therewith hard-and-fast territorial divisions.

For the undergraduate, as for the advanced student, the provisional and shifting character of the rapidly progressive medical sciences is a fact of prime importance. Let us, for the time being, waive the question of research. At the teaching level, too, medical faculties differ, because, incapable from the very nature of the case of being exhaustive, what they offer depends, at a given moment, more or less on personal and local considerations: the point of view or training of individual professors, the laboratory facilities or clinical advantages of the university. Theoretic exposition may be mapped out on substantially similar lines, largely irrespective of local or personal peculiarities; philosophers and philologists may entertain different views and yet expound the same texts or discuss the same general topics. But modern medicine, the complex outcome of a dozen disciplines, each with its own rapidly shifting complexities, lends itself ill to systematic organization or uniform formulation. A typical curriculum is therefore neither conceivable nor feasible.

Within a single institution, a fixed curriculum might indeed be set up: can it be justified? Only if incontestably superior and overruling importance could be predicated of one combination of subjects as against any modification thereof. We shall see that this, too, is impossible: were it true, the logic that defends the fixed curriculum in one medical school would require that it be forced upon every other. The moment we accept diversity among various institutions, we concede the principle of diversity within each. We concede something more, too: the student cannot know everything; mental attitude is more important than most positive acquisitions. Now, the right mental attitude is more likely to be developed by intensive than by extensive training. A sound curriculum will therefore be characterized by simplicity and thoroughness rather than by encyclopaedic fragmentariness; it will be a simple rather than a rococo edifice.

Moreover, variations are likely to grow more, rather than less, marked. The medical school is destined to become at once richer and more various. Something will doubtless be simultaneously saved by elimination and redistribution. Certain subjects will be outgrown; others absorbed. But reorganization cannot keep step with progress. The new and the old must both subsist, side by side, at least until the new has completely proved itself, or the exponents of the old have been peacefully shelved. A growing organism is thus always in a stage of transition, involving logical inconsistencies and maladjustments. In no event, therefore, can contemporaneous readjustment be expected to offset the increasing scope and complexity of the medical school. The curriculum may be lengthened — directly by adding a year, indirectly by pushing back preliminary studies into the secondary schools; but, once more, the time thus gained or added will assuredly not suffice to accommodate the additions making at every focus of activity. If encyclopaedic, or even schematically regular, training were important, not to say necessary, one might then well despair.

The considerations on the basis of which the problem of the curriculum can be solved have been touched on in the preceding pages. What can be fairly expected of a medical education? Not that it shall produce finished and uniformly successful doctors: the right minded physician will never feel himself to be that. Medicine involves the intelligent application of knowledge, method, and experience to the problems of disease. It is a profession, rather than a craft, because of the emphasis which it places upon intelligence as against mechanism. Now, situations that must be resolved by intelligence can never be exhaustively foreseen or provided for. The agent destined to act in them may at the most have become familiar with the more important data they are sure to contain and with the more important instrumentalities he is bound to employ in dealing with them; the knowledge and practical skill thus severally acquired he may have used under disciplinary supervision in typical and characteristic situations, calling for the sort of response that he must eventually make. Obviously, these selected situations need be of no precise character; they need only be sufficiently numerous and sufficiently diverse to require varied and accurate knowledge and to form and to test a habit of action. When the medical school has done so much, it has done its all: critical and conscientious experience in the widest sense must fill in the outline thus drawn. Education has equipped the student with his tools. It has trained him to use them; it has provided some opportunity in which he may demonstrate his capacity to use them. Such limited competency, reasonably complete as far as it goes, marks the well-trained student of medicine at the moment when he makes his exit from the medical school. But of greater importance in the long run is the expansive impetus with which he has been endowed. The limited expertness above mentioned, a rigidly prescribed curriculum might unquestionably produce; but momentum, so far as it is ascribable to educational policy at all, can be developed only in conditions which by their heterogeneity suggest incompleteness and defect, and by their invitation to the assertion of individual bent or capacity fan the sparks of interest into flame.

The diversity of output which is thus obtained is not without important advantages. The uniformity of a prescribed curriculum is at best a specious make-believe: it looks completer and more secure than it really is. Smooth articulations and definitely adjusted hours convey an impression of wholeness not in keeping with the facts. The student's knowledge is at best fragmentary, rough, and at loose ends. In the course of a professional life of average length, the prop will inevitably be knocked from under some of the things which at the moment seem most capable of supporting weight. Heterogeneity of accomplishment and performance tends to deprive the student's faith of its absolute quality; where each has something to learn from the others, all are more apt to be both curious and teachable.

The preceding considerations constitute, however, no argument for uncontrolled freedom. To understand and to manage disease, knowledge and skill separately acquired in each of a dozen different domains must be brought together. These parts are not wholly indifferent to one another. A certain sequence lies in their very nature; the goal to be reached in some sort controls their selection and arrangement. Thus to some extent the several ingredients of the curriculum both require and support one another. These essential inner relations the medical student cannot know in advance; he cannot procure them for himself if he does not know them. Hence, as far as sequence is required by different subjects of whose relations to one another, and of whose comparative importance, the student is ignorant, the curriculum must be a reliable guide. For example: students the world over tend to slight the so-called theoretic branches. They have started out to become doctors; they are conscious of being actually embarked on the achievement of their purpose the moment they enter the hospital wards: left to themselves, they would for the most part go straight from anatomy to medicine. Formerly, there was indeed nothing else to do. Latterly, however, an important body of instrumental data and an indispensable instrumental technique have been worked up. A method of approach has been established. Order enough must characterize the curriculum to insure the student's respect for relations thus created. Freedom to err through ignorance in matters where regret is unavailing is sheer waste, of no educative value.

From a somewhat different side, there is also something to be said for a certain measure of compulsion. From the viewpoint of society, the student of medicine is in a different position from the student of Greek or philosophy. The latter may be left entirely to his own devices; his scholarship and qualifications are ultimately passed on by a jury of his peers,— his fellow scholars and fellow philosophers. On them he cannot expect to impose. Incompetency is followed by merciless and inevitable elimination at their hands; neither scholarship, nor philosophy, nor society suffers: the individual himself pays. But the doctor's public is inexpert. His patients are incapable of judicious appreciation of his merits— or otherwise. The public lacks such summary means of protection against impostors as may be easily invoked by scholars and scientists. The state does indeed interpose with its professional examination. But no examination alone is altogether fair to the candidate or altogether adequate to the public. The general conditions under which a medical education is obtained must themselves constitute such a presumption in favor of good training that both examiner and patient may fairly make considerable allowance on that basis. We shall shortly see that, as now administered, the German state examinations distinctly require such additional assurance. It can be and is partly furnished by the terms of matriculation in the medical school: the unfit are thus largely excluded in advance. But the potentially fit are capable of much subsequent unwisdom. Against this species of folly, arrangement of the curriculum must offer both the student and the public a measure of protection. In this respect the education of physicians resembles all education for definite social ends: it is so far a forcing process. The public needs competent engineers, lawyers, teachers, and doctors, in larger numbers than will be produced by the unregulated action of individual impulse, however strict the scrutiny finally applied. In the public interest, therefore, the state sets up certain conditions calculated to increase the numbers of those who will in the end successfully satisfy its standards.

I repeat, however, that this line of argument cannot be adduced in favor of a rigid and uniform curriculum. No complete agreement could be secured as to its contents, because incontestable priorities cannot be made out; no complete agreement could be secured as to its time order, because the possible interrelations and combinations of fruitful character are infinitely various. Nor may we lose sight of a practical absurdity involved in the very notion of a uniform required course of study. A curriculum that aims to fill the student's time is either too much for the average student or too little for the best. Thus, even were the argument for uniformity stronger, the argument against it from the ethical and intellectual standpoint would demand recognition. In a profession which counts on progressive effort, eventual capacity to advance can be generally promoted only by a régime in which active qualities have been in some measure consistently cultivated. Four or five years of compliance with prescription will result in the atrophy of the voluntary powers. It can be no mere accident that in Germany the requirement of the practical hospital year has been everywhere followed by a decrease in the number of volunteer assistants ready to serve for longer periods. Very likely the importance of forcing a minimum competency upon all students before embarking in practice is a sufficient argument for the hospital year, no matter what its incidental drawbacks; but these results place the burden of proof on the partisans of increasing compulsion. The fact that prescription tends to sap initiative pleads strongly against extreme measures. Such freedom as then remains is not of course without its perils. But it is to be remembered that, after all, the medical faculty is dealing with mature individuals.

Finally, the teacher may not be wholly lost sight of. On him rests at once the double responsibility of training students and advancing knowledge. The combination of these two functions in one individual has proved Germany's most fertile contribution to higher education. The prescribed curriculum tends to emphasize too strongly the former element at the expense of the latter; it converts the professor into a schoolmaster. It will be a dark day when this process is sanctioned as a functional division of labor. At the professional level, where competency is a question not only of particular kinds of skill and knowledge, but of method and inspiration, the student must be trained by actively progressive scientists. In so far as he can safely be made responsible to or for himself, the teacher is freed for the pursuit of original tasks.

The inner relations of the various elements found in the medical curriculum proper suggest a tripartite arrangement. There are at one end the fundamental sciences; at the other, the clinical branches; between them, the sciences that bridge the gap,—

pathology, pharmacology, and bacteriology. In the determination of amounts an irreducible minimum can be agreed on,—whether a little more or a little less is of slight importance; open spaces can be left in each of the three divisions, which the student is free to employ intensively in any one of a dozen ways. The informational side is thus not slighted. Neither does it overshadow all else. When one reflects on the fate of acquired knowledge, one realizes the superior importance of the acquisitive capacity and habit. Something of what the student learns betrays him, by proving false or inadequate; something simply escapes him through mere lack of use. The positive knowledge of any particular epoch is at once uncertain and unsafe. But method and technique abide: if good, to digest and appropriate subsequent experience; if poor, to infect it with their own insufficiencies. Information is of course not to be contemned. It provides in any case the language, the terms, in which the student acquires his art; but it must be so communicated as to assist the formation of the searchingly inductive type of mind.

Some such conception as has been just outlined lies at the bottom of the German treatment of the problem of the curriculum. "Lernfreiheit" indicates not an untrammeled, but a qualified freedom, such as has been here approved. I shall shortly specify the restrictions by which the student's freedom is curbed. But of ethical freedom—the freedom to do his duty or not—he is never deprived. No police duty is asked of the German instructor; as indeed it would be a doubtful service to the public to require teachers to spend themselves in forcing unwilling students to learn enough to enable them to qualify as practitioners at the minimum level, above which such as they would probably never rise.

Compulsion is applied altogether through the examination. The medical student entering the university is not informed that this or that course is to be pursued during the first, second, or any other semester. But he procures a copy of the examination ordinance, from which he learns that he will have eventually to pass two examinations, the first called the "physicum," the second known as the "state examination;" that before admission to the first, he must present certificates testifying to attendance on certain lecture and laboratory courses during not less than five semesters; that before admission to the second, he must present similar evidence of attendance on certain clinics; and that no clinical certificates are valid unless earned subsequently to the complete discharge of the obligations represented by the physicum. Thus indirectly the subject-matter of the curriculum is divided into two mutually exclusive parts, together at least ten semesters in length. The subjects included in the first half he finds to be physics, chemistry, zoölogy, botany, anatomy, and physiology. Thereupon once more indirection comes into play. The student is not required to pursue any particular set of courses by way of preparing for the physicum. He is simply required to present certificates showing that he has dissected during two semesters, and has had a practical course in histology lasting one; that for one semester he has attended a practical course in chemistry and a similar one in physiology. He ascertains that he must be prepared to stand both theoretical and practical examinations in chemistry, anatomy, and physiology;[1] theoretical examinations only in physics, zoölogy, and botany. He is apparently free to obtain his theoretical information where he pleases, and to devote to it as much or as little time as he pleases. It is obvious that the prescription, direct and indirect, taken together, does not necessarily exhaust the student's time; leeway is left for intensive performance. And this play-room is increased for students who bring to the university prior equipment in botany, physics, and zoölogy.

The clinical requirement, likewise dictated by the examination ordinance, is somewhat more complicated. It includes (*a*) certain subjects in which course certificates must be presented and in which examinations are held; (*b*) subjects for which certificates are required, but in which no examinations are held; (*c*) subjects in which examinations are held, but no certificates are required. The subjects (*a*) in which certificates are required and examinations held are the following: medicine, surgery, and obstetrics-gynecology, in each of which a certificate showing enrolment in the appropriate clinic during two semesters is required; ophthalmology and psychiatry, in each of which a certificate showing one semester's enrolment is required. The subjects (*b*) in which the student must present a certificate representing one semester's enrolment, but undergo no separate examination, are the following: the medical policlinic, children's clinic or policlinic, nose and throat clinic or policlinic, ear clinic or policlinic, skin clinic, topographical anatomy, lectures in pharmacology, lectures in legal medicine, vaccination. The subjects (*c*) in which the student is examined without having to submit any certificates whatsoever are pathology and hygiene. Finally, having passed the examinations, he must serve one year in a hospital, of which, as a rule, at least one-half must be spent in clinical activity.[2] In subjects in which no certificate is required, the student is free to obtain his training as he will. And wherever the examination requires skill or knowledge not to be obtained in the certificated lecture courses, he is free to follow his own devices, as indeed he is indirectly compelled to do. The certificated courses in medicine do not include individual training in physical diagnosis; the certificated courses in surgery do not include individual training in dressing and bandaging. Such details the student arranges for himself, by attending special courses, serving as *famulus*, or perhaps even taking a chance without systematic instruction at all.

It is clear that whatever compulsion exists, as far as study is concerned, is exercised only by the examination. Let us assume (for the sake of simplicity we shall revert to the point hereafter) that the examinations are serious affairs: the student must then earnestly pursue up to the point determined by the indications of the ordinance, all the subjects included in the physicum, and in groups (*a*) and (*c*) of the state or clinical examination; the subjects comprised in group (*b*) represent only a

[1] The practical examination in physiology, however, is slight.

[2] In exceptional cases, eight of the twelve months may be spent in laboratory work.

nominal requirement. They must be found in the course book, properly attested by the instructor; but as no check is kept on attendance, the student may attend in order to procure the necessary signatures, and no oftener afterwards than he chooses. In pathology, for example, there are examinations and no certificates; in legal medicine, a certificate but no examination. It results that the student must learn some pathology. The simplest and safest way to accomplish this end is to attend the lectures and courses of the professor-in-chief; but at his peril the student may trust to learning as *famulus* in a pathological establishment, whether that of the university or some other hospital. In legal medicine, the compulsion, apparently greater, is really less: the student must indeed be signed up for the subject,—that is, he must pay for it. He therefore carries his course book to the first lecture, or, in extreme cases, gets a friend to do so for him. In the large universities, this may represent the whole of his connection with the subject; for "signing off" at the end of lecture courses has been abolished, on the ground that the lecturer cannot know enough about the individual student to give his signature any significance; in the smaller universities, where instructors know their students, greater conscientiousness necessarily obtains.

For sake of clearness, the curriculum may then be formulated as follows:

First half (at least five semesters)[1]

Certificates and examination required:	Anatomy Physiology Chemistry
Examination only required:	Physics Zoölogy Botany

Second half (completing at least ten semesters)

Certificates[2] and examination required:	Medicine, in which diseases of children, nose and throat, pharmacology, and therapeutics are included. Surgery, in which diseases of ear and skin and topographical anatomy are included.

[1] There are two semesters yearly, stretching nominally from October 15 to March 15, and from April 15 to August 15. Both are in practice much foreshortened. Lectures are hardly well under way until three weeks after the opening date; they begin to close full two weeks before the closing date, and students fairly melt away a week or two before even that. The winter semester is an effective term of about sixteen weeks, the summer of about twelve.

[2] The certificates must attest the following details: Two semesters' attendance as *Praktikant* in medicine, surgery, and obstetrics-gynecology; participation in four deliveries; one semester's attendance as *Praktikant* in the eye clinic, medical policlinic, children's clinic or policlinic, psychiatric clinic, nose and throat clinic or policlinic, ear clinic or policlinic, skin clinic or policlinic; one semester's lectures in topographical anatomy, pharmacology, and legal medicine; practical work in vaccination.

Certificates and examination required:	Obstetrics-gynecology Ophthalmology Psychiatry
Examination only required:	Pathology Hygiene
Certificates only required:	Legal medicine Vaccination

The dividing line between the two sections—physicum and clinical—is necessarily respected; but on neither side is there enforced coördination of the constituent elements. In the former half, botany may be one of the first subjects pursued, or it may be the very last; in the latter half, pathology may precede clinical medicine and surgery, or follow them more or less remotely. What I have designated as necessary inner relations may thus be wholly lost sight of within each division: chemistry and physics ought obviously to precede physiology, in which they are applied; pathology ought, in part at least, to precede medicine and surgery, which deal with concepts thence derived; physical diagnosis and clinical microscopy are, in the nature of things, preliminary to medicine, as are dressing and bandaging to surgery. Nor are these time sequences inherent in the object important to the student alone. The teacher must definitely know to what extent his presentation of a topic can assume the comprehension of his auditors. The physiologist, for example, can discuss the digestive process on either of two presuppositions, that the student understands chemistry, or that he does not. His presentation will vary widely according as he makes, or does not make, the assumption in question. A definite understanding in the affirmative sense can be warranted only by some sort of official assurance. Not a few lectures begin by presupposing nothing.

By way of supplying more helpful counsel than is contained in the examination ordinance, each medical faculty puts forth a recommended plan, in which the field to be covered is arranged in a sequence running through ten semesters. While the several plans do not fundamentally differ, they prove conclusively that orderly arrangement, adhering to necessary internal relations, is still consistent with a considerable measure of variety. The Leipzig and Würzburg plans, starting from precisely the same initial semester, never repeat each other in any subsequent one.

Leipzig	Würzburg
First Semester (*Winter*)	
Physics	Physics
Inorganic chemistry	Inorganic chemistry
Systematic anatomy, part i (including osteology)	Osteology
Systematic anatomy, part ii	General and systematic anatomy
Dissection	Dissection

Second Semester (Summer)

Botany	Physics
Physics	Organic chemistry
Organic chemistry	Systematic anatomy
Histology	Anatomy of the sense organs
Zoology	
Chemical laboratory	

Third Semester (Winter)

Physiology	Botany
Dissection	Zoölogy
Review anatomy	Dissection
Elective work	Histology

Fourth Semester (Summer)

Physiology	Botany
Physiological chemistry	Zoölogy
Embryology	Physiology
Practical histology	Topographical anatomy
Physical laboratory	

Fifth Semester (Winter)

Physiological laboratory	Physiology
Dissection	Physiological laboratory
Review physiology	Topographical anatomy
Elective work	

Sixth Semester (Summer)

Physical diagnosis for beginners	Physical diagnosis for beginners
Medical propaedeutics	General pathology
Surgical clinic: hearer	Special pathology and therapy
Medical clinic: hearer	Obstetrics
General pathology	Clinical microscopy
Special pathology and therapy, part i	Surgical propaedeutic
Pharmacology	History of medicine
Fractures and bandaging	
Surgical propaedeutic	
Special surgery	

Seventh Semester (Winter)

Women's clinic: hearer	Special pathological anatomy
Surgery	Surgical pathology and therapy
Medicine	Special pathology and therapy
Pathological anatomy	Experimental pharmacology
Skin diseases	Women's clinic
General surgery	Laryngological course
Obstetrics	Medical clinic: hearer
Physical diagnosis for advanced students	Surgical clinic: hearer
Special pathology and therapy, part ii	

Eighth Semester (Summer)

Women's clinic
Surgery
Medicine
Surgical policlinic
Topographical anatomy
Pathological histology
Ophthalmology
Gynecology

Special surgery
Toxicology
Pathological histology
Hygiene, part ii
Ophthalmology
Operative surgery
Medicine
Surgery
Women's clinic
Eye clinic: hearer
Prescription writing

Ninth Semester (Winter)

Women's clinic
Ear, nose, and throat
Laryngological course
Surgical policlinic
Vaccination
Eye clinic
Autopsy course
Diet and nutrition
Pediatrics
Toxicology
Psychiatry

Hygiene, part i
Pathological anatomy
Operative obstetrics
Autopsy course
Physical diagnosis for advanced students
Practical course in hygiene
Medicine
Surgery
Women's clinic
Eye clinic
Medical policlinic
Pediatric policlinic
Skin diseases: hearer

Tenth Semester (Summer)

District policlinic
Topographical anatomy
Eye clinic
Medical policlinic
Hygiene
Operative surgery
Legal medicine
Practical bacteriology
Forensic psychiatry

Topographical anatomy
Legal medicine
Practical bacteriology
Vaccination
Women's clinic
Medical policlinic
Pediatric policlinic
Psychiatry
Ear clinic
Skin clinic
Nose and throat policlinic

The plans above suggested both assume that the student's first semester falls in the winter; a considerable transposition takes place if he starts in the summer instead, for dissecting begins then in the second semester, instead of the first.[1] The sequence may be further disturbed by the student's decision as to his military service. At Würzburg the third semester, at Munich the sixth, is recommended to winter matriculants for this purpose. Whichever suggestion is adopted, subjects assigned to that period must be redistributed, the semester being practically lost. The

[1] A large amount of readjustment is also necessitated by the student's wandering.

two plans above given are, it will be observed, strictly alike only in the first semester. Leipzig commends botany, histology, and zoölogy for the second; Würzburg prefers to remand all three to the third. Leipzig suggests one semester of botany, Würzburg two. The clinical semesters vary so largely as to be scarcely comparable as far as sequence is concerned. Yet, significantly enough, both recommend pathology and physical diagnosis in the sixth, that is, the first clinical semester. In that semester Leipzig includes pharmacology, which Würzburg postpones to the next. Finally, a comparison of the recommended plan with the contents of the examination ordinance, which practically prescribes the minimum, shows that every student is expected to achieve more than is absolutely required. The corresponding plans of other universities contain still further variations.

The defects of the plans lie on the surface. Sound in so far as the fact that they vary is concerned, they assuredly are not built on simple lines. Except perhaps in the earlier semesters, they call for performance so extensive and so fragmentary that consistent or thorough compliance is simply out of the question. Imagine a youth actually struggling with the contents of the eighth semester as recommended at Würzburg, or with the contents of the ninth as outlined at Leipzig. Such multiplication of separate courses does more than overburden the student: it goes counter to that simplicity and concentration of study so highly to be commended in the interest of thoroughness and continuity of application. Neither scheme appears to prize intensive elaboration at selected points. Practically every available moment—and somewhat more —is frittered away upon heaped-up discursive lectures and clinics, plus merely the most obviously essential instrumental courses. Thus both forget the peculiar advantage for which the Germans themselves rightly value their own system.

As to practical courses in general, a word is in place. Excepting for anatomy, the first five semesters at Würzburg contain only two practical courses, involving the student's active participation, a semester each in chemistry and physiology, in both of which a passive semester has preceded; at Leipzig, a practical course in physics is also recommended, but meanwhile an entire year of discursive physiology precedes the laboratory course in the same subject, as it does also in the plans put forth at Munich and Berlin. This disproportion between witnessing and participation, along with consistent postponement of participation, even where both occur, continues throughout the various schemes. The Breslau program alone cautions the student that the "practical course should be taken in closest possible connection with the lectures."

Notable, too, is the absence of gradation, leading from the simple to the complex. Students in different semesters attend the same clinics. The student is recommended to break the ice by attendance on the medical and surgical clinics during a preliminary semester as hearer or onlooker,—a rather poor expedient, for the work is quite beyond him. Propaedeutic clinics in medicine and surgery indeed exist in various places, but no recommendation to attend them is officially made. Finally, the position of pharmacology and bacteriology is to be noticed: both come late in the clinical semesters.

The faculty plans need not, however, detain us longer. Though one is informed that the student is officially believed to be largely guided by them, such does not, on closer investigation, prove to be the case. The actual distribution of time departs greatly from the faculty suggestions, on the one hand, and the minimum requirements of the examination ordinance, on the other. The plans commonly recommend two semesters each of physics and chemistry, and at times two semesters of botany; very rarely indeed are more than a single semester of physics or botany found. The examination certificates require two semesters each in medicine and surgery; the plans suggest three. Not only do the course books frequently show more, but in point of fact the more energetic often visit more clinics than appear on the record. A semester's work each is advised in clinical microscopy and advanced physical diagnosis: only a small proportion show the former [1] and still fewer the latter. Instead of the recommended ten semesters, the average course runs thirteen and a half. Migration, military service, and intensive work at one point or another would disarrange and prolong the schemes even were they inherently sound.

When, now, we turn from the recommended plan to the details of the actual curriculum of the German student, difficulties abound. His courses are registered in a little book kept for the purpose. But he may attend some lectures that he fails to register; or, much more probably, he may fail to attend some that he has registered because he finds them too difficult, uninteresting, or what not. How far the apparent intentions reflected in the course book are realized, it is thus impossible to say. One is assured that the German student attends practical courses with a high degree of regularity; to lectures he goes or not, as the spirit moves him. The course books cannot therefore be regarded as infallibly showing the German student's working hours, though they may probably be taken to indicate approximately the limits within which he works. The sequence and correlation of his studies, if not their absolute seriousness, may, however, be inferred from them. An inspection of course books taken at random in Berlin, Leipzig, Vienna, Würzburg, and other places discloses at once marked divergence from the faculty schemes as well as significant divergences from one another. It is, for example, pleasant to observe that the university environment is not totally lost upon the German medical student. I find one who, passing the summer semester at Munich, tucks in an art course, conducted in the galleries of the new Pinakothek. A second tops off his descriptive anatomy, medical botany, and experimental physics with a course in recent French literature; two years later, at Würzburg, the same individual hears lectures on the Protestant Reformation; the next semester, at Berlin, he attends a course in evangelical church music. A Königsberg student in his first semester registers for a philosophical course on the difference between Knowledge and Belief,— a distinction which it will not harm a prospective physician to pon-

[1] It is probably picked up by the student as *famulus*.

der. One suspects that those who are thus susceptible of aesthetic, historical, or philosophical stimulation do not prove the least zealous of students even in professional subjects. More common still are courses that, close though they be to the professional purpose, still lie a little to one side of the beaten path: here is a student who has had two or three courses in evolution; another, who has worked at the physiology of the circulation; one has studied immunity; another, pain prevention in surgery; a third, comparative anatomy; still another, metabolism. The history of medicine appears, if not generally, at least not uncommonly. Variety assists students to find themselves; moreover, the reciprocal stimulus resulting is most important. For in casual intercourse, every earnest individual is capable of contributing some fact, idea, or point of view not familiar to his fellows.

That elasticity is favorable to intensive application at selected points, so much more effectually formative than conscientious execution of a prescribed plan, is equally clear. Here, for example, is a student who, having obviously struck oil in the region of anatomy, kept at it during each of five successive semesters: in addition to the prescribed minimum, he heard a course of lectures on heredity, and worked successively at the anatomy of the sense organs and the embryology of vertebrates. Another caught fire in the realm of physiology; his course book shows three successive experimental courses in the subject in addition to the required lectures and practicum. No practical work in physics is required; but here is a student who takes two experimental courses in succession, nevertheless. For reasons to be subsequently pointed out, this phenomenon is rarer during the clinical half. Evidently, the possibility of choice stimulates active discrimination; it encourages independent work within the prescribed number of semesters, thereby explaining the readiness of the German student to spend himself freely in independent work afterwards. The stereotyped curriculum would work the other way: denying opportunity for the exercise of initiative during four or five years, it cannot expect to be followed by an outburst of assertive energy.

So effective, indeed, is the German scheme in developing initiative by which the period of training is lengthened and its scope deepened, that the various voluntary activities, heretofore enumerated, deserve to be accounted parts of the curriculum. Even if not universal, they are too common to be regarded as in any wise exceptional. As *famulus*, volunteer, assistant, or advanced worker, every student who takes his career seriously amplifies his necessary training and experience.

There is, however, an obverse side to the picture, which must be carefully examined. The two striking features of German medical education are the domination of the lecture method and the elasticity of the curriculum. We have criticized the former from the standpoint of pedagogic method; we shall shortly see that it seriously interferes with elasticity, particularly in the clinical half of the curriculum. Aside from this, let us see how far elasticity as now in vogue is itself open to objection.

I am not speaking of merely sporadic absurdities or occasional illogicalities. The waste that they involve is not serious. Certainly, the helplessness of the spoon-fed, who never lose a drop and never take in more than they can comfortably assimilate, is in any case more deplorable than the results of an occasional case of mental indigestion due to untimely or too difficult endeavor. I am thinking now rather of those whose entire program is simply impossible. Hopelessly and needlessly overburdened and misdirected, for example, would seem to be the individual whose course book indicates eleven separate lecture courses in his fifth semester, twelve in his sixth, fifteen in his seventh; or another with fifteen in the eighth semester, seventeen in the ninth; or another with twenty in the ninth as against twelve in the next. A Vienna student in the eighth, ninth, and tenth semesters carried 36, 34, and 20 hours of work respectively; another, 39, 43, and 21; another, 40, 45, and 40. The course book of a Freiburg student in his ninth semester contains the following formidable array:

Obstetrical clinic and policlinic (also in sixth, seventh, eighth, and tenth semesters)
Medical clinic (also in eighth and tenth semesters)
Surgical clinic (also in seventh, eighth, and tenth semesters)
Psychiatric clinic (also in seventh and eighth semesters)
Practical bacteriology (also in seventh and eighth semesters)
Pharmacology (also in seventh and eighth semesters)
Otology
Ear clinic
Ear policlinic
Skin clinic
Legal medicine
Medical policlinic (also in tenth semester)
Pathological physiology (also in eighth semester)
History of medicine
Topographical anatomy
Autopsy course (also in eighth semester)
Pediatric clinic
Infant nutrition
Infant care
Nose and throat clinic
Hygiene (also in eighth and tenth semesters)
Protozoölogy (also in seventh semester)

The sixth semester of a Leipzig student runs as follows: clinical propaedeutic; physical diagnosis; surgical clinic; medical clinic; general surgery with demonstrations; special pathology; pharmacology with prescription writing; surgical propaedeutic and minor surgery; bandaging and fractures; operative obstetrics; brain anatomy; forensic psychiatry; disorders of the circulation; theories of reproduction; first aid to the injured; clinical microscopy.

On the other hand, a Würzburg student shows only the following, thus proving that reasonable and sound combinations are also made:

Semester	*No. of courses*
1	4
2	2
3	5
4	2
5	3
6	2
7	3
8	4
9	13
10	8

Whether we look at the recommended plans put out by the faculties or at the actual curricula as evidenced by the course books, it is indisputable that the curriculum is not only confused, but badly congested. In the face of this generally admitted overcrowding, it seems unfortunate that the medical curriculum is not at once freed from the preliminary sciences,—at least physics, botany, biology. That they are neglected in the university is indisputable: their removal to the gymnasium would be to their own advantage, would facilitate the transposition of pharmacology and hygiene, and would improve the possibilities of practical teaching in all branches.

Overcrowding is of course an evil that to some extent cures itself. The student pays for courses in which he must be certificated, not examined: he pays for them and stays away. This is so well understood that it passes unchallenged.[1] Its effect is apparent. Certification was intended to reduce the number of examination subjects by furnishing some other assurance of satisfactory achievement. Under the present practice that assurance is quite lacking. It is abused to reduce the bulk of the curriculum. The certificate rarely lives up to its face. As we shall shortly see, it seems the means of enforced contribution to the lecturer's income, rather than a guarantee of the student's training. Though one hears occasionally of instructors who refuse certification, such action is decidedly exceptional. In courses where *prakticieren* is not necessary, the signature in the course book may be the merest form; in those in which the student must serve as *Praktikant*, the student who answers to his name the required number of times and merely stands by during the professor's demonstration is almost invariably credited for the performance. Overcrowding can thus be partly relieved by neglecting certificate courses in which no examinations are held. But other ways are open. Having taken on too great a load, the student endures a brief period of discomfort, followed by spontaneous simplification of mental diet. Referring to his overcrowded ninth semester, one Berlin student writes: "Topographical anatomy never visited: nose and throat clinic only to procure the required certificate." A second annotates his eighth semester: "Surgery and hygiene systematically 'cut.'" A third writes of his fifth semester: "Visited regularly only the course in physical diag-

[1] A Vienna professor admits to his clinic as *hospitant* (*famulus*) only those who agree to cut all lectures during their term of service.

nosis; the others practically not at all; instead, worked as *famulus* in internal medicine." Of his eleventh semester, including eight courses, another says: "Topographical anatomy never visited; ear clinic and eye clinic perhaps ten times in order to procure certificate; legal medicine and hygiene, once each for the same purpose." On the other hand, three students, enrolled in six courses each in their last semester, testify that they attend all regularly. In the long run, neglect is perhaps less damaging than distraction. Hopeless indeed is the case of those whose days are filled by an unbroken succession of brief lectures or courses dealing with disparate topics. The attention prematurely assaulted by ill-assorted facts and quickly exhausted by the stream of indigestible novelties becomes dazed. The lectures last forty-five minutes each; successive periods bring new topics, whose presentation is overwhelmingly theoretical. Little practical skill is acquired, and only theoretical information.

I have urged that a sound curriculum is built on simple lines. Instead of splitting up a single topic in such wise that each of its elements forms a separate course, which tend to scatter centrifugally, the concentrated curriculum would weld them together, and bring the student into contact with rather larger, more voluminous entities. Such disciplines form a secure substratum; with one or two such at a time, the entire energy of the student would be continuously engaged for substantial periods. Whatsoever specialization is added thereto should take the form not of six weeks' courses dealing with various technical tricks, but of protracted efforts to acquire sound habit through effective dealing with a definite topic. Now, the overburdened curricula above cited are obnoxious to this principle, not only because too many general subjects occur in each semester, but because the same general subjects recur in too many semesters. Out of the five clinical semesters, the first course book I pick up at random shows obstetrics, medicine, and surgery of general character in four semesters apiece; the next shows obstetrics in four, medicine in three, and surgery in all five.

So much for content. Still more serious criticism may be directed against the lack of such measure of logical correlation as seems indispensable if the student is to avoid hopeless floundering and senseless waste. I have not now in mind innocent and pardonable absurdities; it is, I daresay, of little permanent consequence that the premature curiosity of one student hurries him into forensic psychiatry in his first clinical semester; or that another hears, without obtaining credit for, venereal diseases along with chemistry, physics, and anatomy in his second semester. But sequence cannot be immaterial when the faculty schemes invariably introduce physics and chemistry before physiology, and invariably insert physical diagnosis and general pathology in the first semester of the clinical division (the sixth semester): in that semester the Würzburg, Berlin, or Munich student is warned away from the medical clinic; the Leipzig student advised to attend only as listener.[1] The advantages of the suggested

[1] At Breslau, however, the student is advised to attend the medical clinic in his sixth semester. In Austria, the fifth is the first clinical semester; at Graz, the faculty plan postpones the medical clinic to the next, devoting the fifth semester to pathology and physical diagnosis.

sequence are self-evident: to the student, because he can form no definite conception of the conditions exhibited without previous training in physical signs and in pathological as well as normal physiology and anatomy; to the lecturer, because otherwise he speaks a foreign language, unintelligible to his hearers. The student can of course in no event complete pathology by way of a clinical preliminary; it necessarily recurs, when subsequently his clinical training enables him to come to closer quarters with the subject; the interplay at the latter stage is most intimate. From this point of view, inspecting seventy-two transcripts of student course books, I find that seven had done some work in pathology before taking up any clinical work; forty-three entered pathology and the clinics simultaneously; nineteen began pathology only after one or more semesters in a clinic, some of these after the lapse of two, three, or even four semesters, with medicine, surgery, and gynecology sometimes entirely completed beforehand; three are not signed up for pathology at all.[1] In these figures, I have reckoned as beginning pathology before and with clinical medicine all whose course books mention any pathological course at all at those periods. As a matter of fact, many of these heard only lectures of slight assistance toward the end here in view. Von Hansemann maintains that concrete pathological experience is less apt to be found at the beginning of the clinical semesters than at the close, when the examination in pathology heaves in sight, — too late, of course, to be of service to the student in apprehending the phenomena of disease. Of 137 *famuli*, serving with him at Friedrichshain, only 29 had recently weathered the physicum; 108 stood in the higher semesters. "I can state," he says, "that among the latter there were intelligent and industrious students, who had already obtained the certificates for *practicieren* from all the requisite clinics, without possessing the remotest notion of pathological anatomy. To me it is entirely incomprehensible, how a student can grasp the significance of auscultation and percussion, the meaning of palpation, the normal and abnormal course of pregnancy, without accurate pathological knowledge. I cannot imagine how a clinician can explain the course of pneumonia, Bright's disease, etc., to students incapable of forming the appropriate anatomical picture."[2]

The faculty counsel is more diligently heeded in respect to elementary percussion courses: for a very large proportion of my cases show such a course in the sixth, a few even in the fifth semester; nevertheless, instances occur in which the art of physical diagnosis appears to be systematically studied for the first time in the seventh, ninth, and even tenth semester.[3] The advanced courses often recommended for a later semes-

[1] They were probably *famuli* at some time or other. I was told by one professor that twenty per cent of the students enter the examination in pathology without having had a course in the subject. As to this, no accurate statistics are obtainable. The instructors in pathology urge the requirement of a certificate.

[2] "Die Bedeutung der pathologischen Anatomie für den medizinischen Unterricht," *Zeitschrift für Aerztliche Fortbildung*, 1904, No. 11.

[3] Some students who take a systematic course late may have learned the technique as *famuli* earlier.

ter are attended by a very small, practically negligible number. Fractures and bandaging occupy with reference to surgery a position similar to that of percussion and auscultation with respect to medicine: an appropriate course is usually recommended for the sixth semester. Twenty-five course books show that five students took such a course on beginning surgery; nine later, most of them in the tenth semester, with an evident eye to the examination; eleven not at all. Not uncommonly the student plunges at once into the most intricate aspects of the subject.[1] A Berlin student is certificated in surgery at the close of his second clinical semester without having had pathology, minor surgery, or bandaging; having thus in his seventh semester satisfied the requirements, two semesters later he is found in a course in operative surgery. A Würzburg student takes the surgical propaedeutic in the ninth semester, having already spent three successive semesters—the sixth, seventh, and eighth—in the regular surgical clinic. A study of the sequence in obstetrics discovers students working with the manikin in the eighth semester after having spent the seventh in the obstetrical clinic. To some extent, these anomalies are more or less tardily set right by experience as *famulus;* but by no means generally, and in any event the waste and confusion are serious. One cannot avoid the conclusion that failure to arrange a more logical order results in widespread neglect of fundamental correlations of both theoretical and practical nature.

The Germans have proceeded upon the theory that, protected as they are by university standards and ideals, the state examination alone is capable of retroactively regulating details. It is, as a matter of fact, an error of judgment to expect too much of the examination. The policy of the examiners is and must be determined by the general educational scheme. The basis of matriculation and the quality of the instruction constitute the point of view from which they regard the candidates before them. What they require inevitably flows from what the system fairly permits them to expect. They will adjust themselves to the defects and peculiarities of the system—are they not themselves its product?—rather than endeavor by ruthless execution to force far-reaching modifications.

If, then, organic defects of correlation exist in an educational scheme, they must be corrected by arrangement. The difficulty is to introduce order without sacrificing elasticity. This seems a not impossible achievement, if the curriculum is laid out on lines at once broad and simple. Physics, chemistry, biology, and botany must precede the medical course proper; anatomy, physiology, and pharmacology would then constitute the physicum; pathology and perhaps physical diagnosis would occupy an intermediate position;[2] the clinical branches would conclude the whole. Within each division leeway could be preserved; coördination would itself effect economies of time and effort.

What is lost in elasticity by such regulation can be offset by resort to certification

[1] Taking, for example, at the start, "select chapters in surgery" at Berlin.

[2] Beneke proposes a special examination on these subjects following the physicum. "Vorschläge zur Verbesserung des Studienplans der Mediziner," *Berliner Klinische Wochenschrift*, 1908, p. 37.

without examination: for the curriculum is stiffened by the necessity of deliberate preparation for many separate examinations, as well as by the enforced sequence of its contents. Certification seems an excellent method of relieving the examinations, or preventing further increase in their number. For nothing is more certain than that as examinations become more numerous, they become more perfunctory and mechanical. The more the expert coach or crammer is required by reason of the necessity for carrying additional subjects at the tongue's end, the more inelastic the course of study and the less the net protective worth of the examination itself. Of course, certification is itself an idle form unless the certificate represents actual value. The certificate ought in all conscience to be a reliable evidence of practical participation; and if reliable, it may very properly be substituted for examinations in the less fundamental topics, specialties, etc. But, however legitimate in point of theory, the certificate cannot, as a matter of fact, be regarded as expedient until, participative having succeeded demonstrative instruction, the student becomes part of the out-patient or ward service on such a footing that duty, interest, and responsibility combine to foster regular activity as his part.

Consideration of the German curriculum leads us, then, to the conclusion at which we arrived after surveying the different subjects of instruction. A sound curriculum is a simple curriculum, which requires all to pursue certain indispensable topics, and each at some point to engage in more thorough intensive work. But in order that instruction, economical of time, may be effective in attaining the desired result, it must be soundly organized: participation, not demonstration, must be the keynote of the method employed. Moreover, when once German medical instruction becomes participative, the necessary degree of arrangement and correlation will at once be forced: for where students take part, they must have acquired the necessary instrumental knowledge and skill before participation.

A serious obstacle to this improvement lies in the constitution of the university. The change from demonstrative to participative instruction would probably involve considerable recasting of the entire medical faculty. Originally, the German university was a lecturing institution. By means of lectures, knowledge was for centuries expounded and transmitted, and transmission by exposition remained the chief function of the university up to the nineteenth century. The lecturing university consisted essentially of a relatively small faculty of professors, the *ordinarii*, so called, —forming the official teaching staff, beside which there grew up an informal and unofficial teaching staff of decidedly modest proportions,—the docents, and so-called professors extraordinary.[1] This unofficial teaching body was originally little more than the garden plot in which prospective *ordinarii* were grown. The *ordinarii* were the teachers, as they were the sole governors of the university; departmental organi-

[1] In 1785, there was a total of 376 *ordinarii*, 86 *extraordinarii*, and 38 docents in all German universities; at the close of the century, the proportions remain practically the same: in 1796, the numbers were 619, 141, and 86, respectively. Eulenburg: *Der Akademische Nachwuchs*, p. 10 (Leipzig, 1908).

zation there was none; a single professor represented a subject,—the subject sometimes of vast extent: anatomy, physiology, and pathology constituted, for example, one chair, whose incumbent covered the field discursively every semester or two. Faculty government was of a primitive kind; things ran on straight lines; every professor followed his own preference; there was no attempt to bring about pedagogic coöperation.

It is unnecessary to repeat what has already been said in reference to the changes introduced in consequence of the scientific developments of the nineteenth century. Suffice it here to state that additional chairs have had to be created,[1] and that every department has undergone complex internal transformation. Numerous instrumentalities have had to be created to keep pace with the increasing specialization of function required by research. A department ceased to be an individual; it became a complicated interacting group. The newly added members received no consistent title. They were, in effect, laboratory or clinical assistants of varied status; now important enough to be head of a division independent in all but name, again hardly more than an additional arm or hand. Now a docent, now a professor extraordinary, again a titular professor, a mere assistant, or even a volunteer,—in number, variety, and definiteness of function, the academic after-growth embodies the response of an institution splendidly vital, despite its mediaeval structure, to a wholly new set of conditions. Its whole life has changed correspondingly. Departments could no longer thrive in cloistral isolation; active interrelations sprang up. More and more they had to rely on and to coöperate with one another; the university became, in fact, highly complex,—an organic thing.

We should expect to find a change in university government and in university teaching corresponding with the change that has taken place in departmental organization. It has not yet come about, and, as I hope to show, the maladjustments in German medical education are partially traceable to this fact. I have said that a single professor has ceased to be a department; chemistry, physics, medicine, and surgery are each represented and cultivated by groups. But the necessarily organic constitution of the several departments, and the organic nature of their interrelationship, have not affected the constitution and management of the official university. The *ordinarii* are still the university, and each of them still goes his own way. Subdivisions within the department pursue pretty much the same policy. A division chief in Berlin, who three years before was called from a Swiss university, informed me that in all that time he had never had a conference with any one in reference to the apportionment or organization of either teaching or research. He did as he pleased, following the example of his superiors. Neither the government of the university nor the offering or conduct of courses takes explicit and adequate account of the changes which have come about in the constitution and internal relations of scientific knowledge.

[1] These new chairs are not always of full faculty rank. While ophthalmology was made a full professorship, dermatology and pediatrics are as a rule held by *extraordinarii*.

The lack of correlation which thus results is protected under the imposing name of university freedom. Now, as a matter of fact, the student's freedom has already been so often impaired — even though in many instances quite ineffectively — that its further or different abridgment in the interest of intelligent coördination cannot be consistently refused. The examination ordinance, as it now stands, violates academic freedom in a dozen ways. Important as it is, from every point of view, not to use up the professor in stereotyped teaching or the student in mechanized study, an abstract principle already infringed cannot be permitted to obstruct the systematic organization of the curriculum on such lines as are implied by the fundamental necessities of the subject-matter, more especially as sufficient freedom will remain, even after the essential correlations have been assured.

There is, however, another obstacle. The German professor receives his remuneration partly, sometimes largely, in the form of student fees. An entirely different system of financing would be required if the large lecture groups on which he relies for his income were broken up.[1] An oligarchical form of university government and pecuniary necessity have thus combined to resist the expansion of the teaching body to keep pace with the growth in university attendance and the complications of subject-matter. In fact, the total number of *ordinarii* was greater in 1796 than in 1860, — 680 as against 600.[2] Only since 1870 have the *ordinarii* grown in numbers; the main expansion has been in the ranks of the *extraordinarii* and the docents. Between 1880 and 1906, the ordinary professorships in the medical faculties of Germany increased from 194 to 246, that is, 26.8 per cent; the extraordinary and docents from 330 to 725, that is, 119.7 per cent.[3] While the total student enrolment in Prussia has in the last three decades increased 159.6 per cent, the teaching staff has increased 41 per cent.[4] The following table shows the development of the medical faculty of Berlin:

Year	*No. Students*	*No. Teachers*	*No. Ord.*	*No. Extraord.*	*No. Docents*	*Hon. Professors*
1855–1856	261	39	11	8	20	
1875–1876	263	66	12	17	37	
1895–1896	1226	119	15	30	70	4
1907–1908	1153	189	18	44	117	10

In other words, while the student body increased from 261 to 1153, and the teaching staff from 39 to 189, the number of *ordinarii* grew only from 11 to 18.[5] But the disproportion is in fact even more marked than appears: for meanwhile both the teaching method and departmental organization have altered. Where lecturing suffices, indeed, the teaching staff need not grow *pari passu* with the student body: a professor

[1] For a moderate statement in favor of the fee system, see Paulsen: *German Universities* (translated by Thilly), pp. 90, etc. (New York, 1906).

[2] Eulenburg: *Frequenz*, p. 280.

[3] Eulenburg: *Academische Nachwuchs*, p. 31, note.

[4] *Die Lage der ausserordentlichen Professoren an der Preussischen Universitäten*, p. 36 (Magdeburg, 1911). Eulenburg (*Nachwuchs*, p. 13), taking in all German universities, finds the student increase 119 per cent, the increase of *ordinarii*, 31 per cent.

[5] Pagel in *Deutsche Medizinische Wochenschrift*, October 6, 1910, p. 1844.

can lecture to two hundred as readily as to fifty. But practical work and specialization within laboratory and clinic require augmented staffs, even where student enrolment remains stationary. Finally, the increase above noted on the unofficial side is itself in part nominal, for the university status of an appreciable number of professors extraordinary and docents is merely external: both titles, having commercial value, are at times sought and exploited for no other purpose. The holder announces courses which attract, and are expected to attract, no students; meanwhile, his door-plate bears the legend "university professor" or "university docent."

Let us bring these considerations to bear on the problems of teaching method and curriculum. Brief consideration will, I think, demonstrate that the composition of the medical faculty is an important factor in explaining the persistence of the lecture method, the splitting up and lack of coördination of the instruction. The persistence and inordinate scope of the lecture are responsible for the overcrowding of the curriculum through repetition. *The required courses are invariably the courses given by the ordinarii.* All the courses for which the student is compelled to procure a certificate before admission to examination are held by the *ordinarii.* As long as the *ordinarii* are few in number, are paid mainly in student fees, and conduct well-nigh all courses that the student is officially compelled to take, so long will mass teaching prevail, so long will participative coördinated instruction remain undeveloped. No other result is possible. Eighteen *ordinarii* at Berlin form the faculty for 1200 medical students; 14 at Munich for 1908; 23 at Vienna for 1869; 10 at Leipzig for 618; 12 at Breslau for 414; 13 at Greifswald for 258. If this relatively small body of teachers is to have main charge of the students, at least to the extent that required certification applies to the courses of the *ordinarii* and to those almost alone,[1] then mass lecturing is inevitable. The fact that in each university a certain number of *extraordinarii* have teaching-posts, representing the newer subjects, does not greatly relieve the situation; for the same arrangement prevails in those. The *extraordinarius* is in such instances the *ordinarius* minus a seat in the faculty. Outwardly, he deports himself like an *ordinarius.* He too must come into contact with the entire student body,—he covets the prestige, he receives the fees, and at times serves as examiner. The lecture is the only teaching method that keeps, or can keep, the professor, be he *ordinarius* or *extraordinarius,* in command of the entire body, whether as teacher or as examiner.

Ways of correcting the most glaring insufficiencies of the lecture system have been found without attacking the main structure. Students have somehow to learn to manage the stethoscope, the ophthalmoscope, bandaging, obstetrical manipulation, etc.,—arts which can be taught only to small groups. I have already pointed out how this has been accomplished by utilizing the subordinates in the laboratories and clinics. Two birds are thus killed with one stone. Laboratories and clinics need larger staffs of scientific workers; students need some individual teaching. As the funds of the

[1] Excepting only the few instances in which certification involves *extraordinarii* in charge of an important branch (for example, medical policlinic).

university are inadequate to support proper staffs, the income of the docent from practical courses furnishes an indirect support. The departmental head,—*ordinarius* or *extraordinarius*,—who completely controls the resources and equipment of laboratory and clinic, permits his assistants, docents, titular professors, or what not, to use his material in conducting special courses of a practical kind. Despite their isolated and wholly optional character, these courses represent one of the strongest assets of the German university. For they support scientists during their period of probation, make an arena where new ideas may be tried or disseminated, render the elasticity of the curriculum a real and most important factor, and supplement the theoretical lecture instruction with practical group instruction, excellent as far as it goes. German medical education is thus concrete and practical to the extent that supplementary courses of this sort have been devised. But where they stop and the demonstrative lectures begin, German medical education is not concrete and practical, but theoretic and passive. The practical courses, therefore, leave the monopoly of the chief untouched. The *ordinarius*, protecting his position, blocks the entry of complete practical training into his clinic.[1] For the courses given with his tacit or express consent are either merely instrumental, merely technical, or highly special: courses in auscultation and percussion, for example, in clinical chemistry, or in sense-physiology. These are only partial or special aspects of the general subjects, for which the student must recur to the lectures of the chief. He has as to this no option: no one else really gives clinical instruction in a total form, just as no one else teaches general anatomy or general physiology; no one else examines, no one else can sign a course book in the required subjects, no one else can issue a certificate that is legal tender. As long as this power is concentrated in the hands of a small body of professors, lecture instruction is their only recourse.

Repetition and overcrowding inevitably result: the official make-believe holds that the student is expected to learn by attending lectures and witnessing demonstrations. In good faith the beginner falls in with this tradition. He attends his first clinic; finding little profit therein, he attends a second, a third, and yet a fourth. He takes meanwhile a practical course—perhaps several of them—and returns to the attack, endeavoring to correct the fundamental vices of the teaching method by sheer repetition. Six students taken at random attended respectively 4, 7, 6, 4, 4, and 6 lecture courses in medicine; the same individuals attended each from 4 to 6 lecture courses in surgery; some of them from 4 to 6 in the women's clinic. They also show respectively 8 practical courses out of 35, 12 out of 49, 13 out of 42, 6 out of 34, 6 out of 26. Overcrowding with lectures, viewed from this angle, is not a defect due to abused elasticity, but the futile and frantic effort to correct by sheer multiplication defects in method that persist because they are the bulwark of an antiquated and narrow university organization.

[1] Private drill classes aiming to cover the entire field are, however, organized with a view to the impending examinations.

If, on the other hand, participative instruction is to be introduced, clinical material must be divided; departments must be conducted on lines consistent with the principles on which scientific knowledge is organized. Different departments must explicitly recognize and calculate with each other. Moreover, the size of the student body must be in some definite relation to the size of the staff and the extent of the teaching facilities. When the capacity of an institute or clinic is reached, another must be provided or enrolment must be halted; for, while the lecture method adjusts itself by enlarging the auditorium and raising the voice, practical instruction soon encounters stubborn limits, to overpass which involves deterioration. But organization that complies with these terms leads to a wider diffusion of authority, with university government not through a small faculty, limited to *ordinarii*, but through representatives of the entire university cosmos,—a democratic organization, in a word.

There is indeed a notion current that the German university faculty is already a thoroughly democratic affair. So it is—internally. The ordinariate, viewed as a thing-in-itself, is an absolute democracy—a small society of equals. Viewed in relation to the university as a whole, however, it is a narrow oligarchy, a close corporation. The *ordinarii* alone govern; they alone have rights; no other rank has even representation. The rotating rectorate is not calculated to remove the defects to which an organization of this type is exposed, for the rector is little more than an ornamental figure,—the official spokesman of the institution during his brief term, hardly more. Nor is a more democratic spirit likely to blow from the ministry, centralization of authority in which, with all its advantages of intelligent general direction, is not apt to facilitate easy and natural readjustments.

From an outside point of view, the important lesson to carry away is that the defects in German medical education are not necessarily inherent in university methods, but spring rather from failure to square university organization and government with the requirements of modern science. There is no reason why university instruction should be theoretic, and non-university instruction concrete. University instruction is indeed already practical and investigative at the higher levels; it can be made practical at the lower level, also, if a proper organization is installed. Meanwhile, that freedom which is the life-breath of science and scientific teaching need not be impaired; for every improvement in teaching will strengthen the student in the power to make wise use of reasonable liberty, without in the least interfering with his tendency to migrate.[1] The overburdened curriculum would then disappear without being forbidden; responsible duties at particular times and places would enforce a wise distribution of time and an efficient correlation of activities.[2]

[1] We have already noticed that in England the clinical instruction is concrete in character, without being rigid in its sequences. Nothing but custom interferes with migration on the part of the English student: he might well do some of his clerkships in Edinburgh, others in London.

[2] For the sake of simplicity, I have made no separate account of Austria in the preceding discussion. Differences between Austria and Germany are not material where likenesses preponderate so

It remains still to describe and to discuss the last of the factors which contribute to the making of German doctors,—the examination. In the German Empire, state and university examinations are to be distinguished.[1] On the former depends the title of "praktischer Arzt," that is, the license to practise; on the latter, the academic degree of M.D. The latter may be dismissed with a few words. Usually taken after the state examination, it is in most instances little more than a costly formality: the candidate contributes a brief autobiography and from fifty to one hundred printed copies of a thesis,[2] and the dissertation is usually compiled according to formula. Nevertheless, exceptions occur: it happens sometimes that in the process of preparing a thesis, a student may disclose to his teacher or discover for himself a new kind of capacity and interest. In any event, the necessity of studying and reporting upon the literature of a theme is not without advantages. His thesis accepted, the candidate appears before a committee of the faculty, the dean or his representative and at least two colleagues, by whom he is colloquially interrogated for fifteen minutes each: perhaps the most formidable aspect of the ordeal is the expense—some three hundred marks or more.

The state examination is much more serious. It is held at every university in Germany under the auspices of a local commission composed of teachers, and well-nigh wholly of *ordinarii*.[3] As candidates are examined either singly or in small groups,[4] the examinations constitute a fairly continuous performance during the entire

greatly. In Austria some of the *extraordinarii* have seats in the faculty. Two representatives of the docents also attend faculty meetings, without voting. It must be added that the professors there, being salaried, receive no fees, though they are agitating for a return to the fee system. The practical year is not required. The sixth semester is preferred for military service. There are three examinations, known as the first, second, and third rigorosum respectively, the first coming at the close of at least four semesters, the last six semesters later. The first rigorosum includes biology, medical physics, medical chemistry, anatomy, histology, physiology; biology and physics are only theoretical; the others theoretical and practical. The second rigorosum includes (*a*) pathological anatomy and histology, (*b*) general and experimental pathology, (*c*) pharmacology and prescription writing, (*d*) internal medicine, (*e*) pediatrics, (*f*) psychiatry and neuropathology. Subjects (*b*) and (*c*) are theoretical only, the others theoretical and practical. The third rigorosum contains surgery, obstetrics, gynecology, ophthalmology, dermatology, hygiene, legal medicine, the last two only theoretical. In addition, certificates must be presented covering vaccination and six weeks' courses in laryngology, otology, and dentistry. The course book must show that the student has paid for twenty hours' instruction a week, except in the last semester of the first rigorosum, when sixteen suffice.

The recommended plan does not differ in principle from the two German specimens given above.

[1] Not, however, in Austria, where one suffices for both objects.

[2] Leipzig permits the thesis to be in manuscript.

[3] Theoretically, the office of examiner in the state examination is open to any teacher; in effect, it is restricted to *ordinarii*, and such *extraordinarii* as hold definite teaching-posts. While examiners are severely burdened, their income in examination fees is considerable. In addition, lecture fees are also indirectly increased, for students incline to enroll in the courses of their prospective examiners. The considerations which recommend enlargement of the official teaching staff plead with equal force in favor of enlargement of the examining staff. As to exceptions, see H. Waentig: *Zur Reform der Deutschen Universitäten*, pp. 5, 22-25 (Berlin, 1911). In Austria, the state is supposed to be represented at the second and third rigorosa by an assessor, but his attendance is apparently rare, as must be the case where examinations are conducted through the entire year. The dean also attends for part of the time.

[4] In the German Empire not exceeding four candidates as a rule, but in Berlin and Munich the groups at times include six to eight; in Vienna sometimes more. In the clinical examinations in the German Empire a single patient may, as a rule, be used with only one candidate.

semester. Before admission, the student must strictly comply with all the required formalities; he must submit a diploma of graduation from the gymnasium, proof that he has spent at least five semesters at the university, and certificates covering the required courses and lectures. The first examination lasts as a rule four days, anatomy consuming two, physiology one, and the remaining subjects one. The official regulations specify that in anatomy each candidate is to describe a designated part, to make a dissection, answering appropriate questions *viva voce* as he proceeds, and to make two microscopical preparations, orally replying thereafter to questions calculated to discover whether he is fundamentally trained in histology and embryology. The examination in physiology covers general physiology, including physiological chemistry, and requires both oral and practical work; the examinations in physics and chemistry, oral only, are meant to keep in view especially the needs of the future physician; in zoölogy, comparative anatomy and physiology are to be emphasized; in botany, the anatomy and physiology of plants, especially those with medicinal properties. Should the student fail to pass in any subject, he may be allowed two more trials, from two to twelve months later. If two years elapse before the entire examination is passed, the slate is wiped clean of all credit. If on the third round a failure is scored, the student is denied further chance even to retrieve,[1] though, as we shall see, in practice this does not happen.

For the clinical examination, for which a similar committee is designated, two periods are appointed, beginning about the middle of October and the middle of March, respectively: it is presumed that the latter will not extend beyond the middle of August. The student must before admission furnish official proof that he has passed the first set of examinations without condition, that he has now attended the medical faculty for at least ten semesters, all told,—at least four of them since the completion of the physicum; he must file his course book, properly attested for required courses, and the requisite laboratory and clinical certificates. The examiners are directed to proceed as follows:

Pathology, divided into two parts,—pathological anatomy and general pathology,—should occupy one examiner two days: the candidate must show his ability to do a post-mortem, actually autopsying one of the three chief parts and writing the protocol; he must make two or three microscopic preparations, expounding at least one, and finally he must be subjected to a searching oral quiz on the principles of the science. It is worth noticing that the examination, unlike the teaching in pathology, is correctly placed between the two sets of examinations. The medical examination proper follows; it falls into two parts, and as nearly as may be is to be completed in seven successive week days. In the first part, conducted by two examiners in the medical wards or policlinic, the candidate must be required on two successive days to examine two patients, making diagnosis, suggesting treatment, and venturing a prognosis; at home he must write a critical account, to be turned in the

[1] In Austria, an application to the Emperor results in further trials.

next day; thereafter daily, for four days, he must visit the patients once a day or oftener, reporting his observations to his examiners. Incidentally, the candidate is to demonstrate his capacity in other directions, — in therapeutics, pediatrics, laryngology, etc. The second part consists of a written examination in prescription writing and an oral examination in pharmacology and toxicology.

The surgical examination embraces four parts, to be discharged in seven successive week days. Two examiners are usually concerned; the scene is the surgical clinic or policlinic, and for the final portion, the anatomical institute. In the first part, it is directed that, as in medicine, the student on two successive days examine two cases, making diagnosis and prognosis and suggesting treatment, following which he must prepare a critical account of both at home; he must look after and report on his two cases for four days thereafter. Incidentally, opportunity must be sought by the examiner to test the candidate's competency in other directions: does he understand anti- and a-sepsis, can he do minor operations, has he sufficient acquaintance with diseases of the ear, and skin, with syphilis, etc.? In the second part, he is to be interrogated *viva voce* on the principles of surgery and to be required to operate on the cadaver; the third part is a practical exercise in bandaging, setting of fractures, etc.; the fourth is devoted to topographical anatomy.

Obstetrics and gynecology, divided into two parts and conducted by two examiners in the women's clinic, are to occupy five successive days: in the first part, the candidate must be required to make an examination, explaining the conditions found and their import, to take part in the delivery, and thereafter to hand in a critical account of the same; on four successive days he is to visit mother and child, reporting on the condition of both; incidentally, he must be orally quizzed in such wise as to test his general knowledge and competency in respect to both obstetrics and gynecology. The second part of the examination is concerned with the manikin and the use of instruments.

One examiner takes charge of ophthalmology. The test, spread over three days, requires the student to examine a patient, make diagnosis and prognosis, and suggest treatment. He must visit the patient on two successive days and submit a written précis; the usual oral questioning accompanies. For psychiatry a single day is required. The student examines a patient and undergoes *viva voce* interrogation. Hygiene and bacteriology occupy a single day; the examination is altogether oral and theoretical. All examiners are warned to touch on the history of their branch and its relations to legal medicine. As a rule, though only a week is required to elapse, intervals of six weeks usually separate a candidate's several examinations; if, for example, he attempts pathology in mid-October, internal medicine would be reached about December, etc. Failure in any subject may be removed by reëxamination, the respite running from two to twelve months, according to the seriousness of the deficiency. A third failure in even a single subject would be fatal to the student's ambition; he would be excluded from the profession. The practical year follows unconditioned success in the examinations. The student repairs to any one of a considerable number of recognized establishments, in which he is counseled to improve his practical capabilities and to demonstrate his fitness to enter upon the practice of the profession. His year may be equally divided between the clinics and the laboratories of the hospital; but for cause shown, two-thirds of his time may be devoted to the latter.[1]

What are the merits, what the demerits, of the German state examination? The former are obvious: in so far as in its application it conforms to the requirements, its general tendency is to force the student to acquire practical skill. The foreknowledge that to pass in anatomy he must dissect, to pass in medicine he must make a physical examination and a diagnosis, to pass in obstetrics he must participate in a delivery, cannot but exert a wholly favorable influence on the course of his studies and efforts. Moreover, the moral and practical aspect of the inevitable tête-à-tête is indisputably great, particularly in the smaller universities, where professor and student are acquainted with each other, and where to the mortification of failure there would be added a kind of personal humiliation.

The theory and the practice of the examination are, however, far apart, — so far, that it is quite clear that not even a practical state examination can be relied on to force medical instruction to be markedly better than the general conditions under which it is carried on. The examiner, in a word, is disposed above all to be fair; that is, to require only what, under the circumstances, may be justly asked. His function is judicial; and among the elements which determine his judgment will be found a more or less generous allowance for the sort of instruction provided, for the failings of youth, and for the traditions of the university. The detailed specifications of the state are therefore none too scrupulously obeyed. They are, as a matter of fact, not quite enforceable. I have said that the examinations are practically a continuous performance; the clinician is expected to examine an almost endless chain of candidates, each of whom he sees several times. Meanwhile, none of his other functions is suspended; he lectures, investigates, writes, attends meetings, conducts his clinic, and sees his private patients. Examining must accommodate itself to these current engagements; it does, and is more or less hurried and crowded in consequence. Now, haste is more apt to lead to laxity than to summary rejection. Time presses for another reason. Theoretically, the test is a face-to-face encounter between a teacher and a single student; in practice, as many as eight students may have to be handled at once. I met a Berlin student who was one of twelve when examined in psychiatry. The entire character of the transaction is thus altered. The practical test cannot be stringently or thoroughly applied; oral facility on the part of the student enables a merciful examiner to square himself with his conscience. In such subjects as are tested only *viva voce*, — physics, botany, pharmacology, hygiene, and in Austria legal medicine

[1] See *Die gesetzlichen Bestimmungen über die ärztlichen Prüfungen für das Deutsche Reich* (Berlin, 1908). The Austrian regulations differ only in so far as they are somewhat simpler, and do not require the practical year. See *Vorschriften für das Studium der Medizin und die Rigorosen* (Wien, 1904).

and experimental pathology,—a single student at the larger universities is on the stand for not exceeding fifteen minutes. The inevitable realization of the possible injustice of a decision arrived at on evidence so incomplete halts an unfavorable judgment in any but extreme cases. It is possible that the examination would more nearly conform to the official stipulations if it were concentrated in several days each term: in that case, the professorial decks could be cleared for action.

The intended practical character of the examination is also in some measure belied by the extent to which "cramming" flourishes.[1] In Berlin, this industry reaches large proportions. Everywhere cramming is favored by the succession of examinations at considerable intervals. The student crams for anatomy, having achieved which he prepares in the same fashion for physiology. A succession of hurdles sufficiently far apart involves no more strain than leaping one hurdle at a time and preparing in a leisurely way for the next. For cramming, one apology may fairly be made: it is a way of bridging the gap between teacher and taught which mass teaching creates. Moreover, the examination calls for some kinds of accomplishment hardly otherwise to be acquired. The student's critical reports above mentioned must contain a case history properly worked up. In all the authorized and required clinical teaching there is never a moment when his teacher can or does require that of him. Unless as *famulus* he acts as clerk in a medical clinic, he would, but for the expert drill-master, draw up his first case history in the process of final examination!

Clearly, the state examination is less practical and more theoretical than the regulations design; and both theoretical and practical examinations have deteriorated. Pagel declares that the examination in botany has degenerated into a mere farce.[2] Despite the state's detailed requirement, the examinations bear no uniform or consistent character. They vary greatly with the individual. One examiner may construe the absence of required certification as imposing an additional obligation to be strict. I met a pathologist, however, who took precisely the opposite view. Regarding as indefensible a method which left the student free to attend lectures and courses or not, as he pleased, he refused to visit upon students what he conceived to be the defects of the system. A third pathologist confessed to me that a student could pass his examination without having taken a practical course. One important clinician described his examination as "very mild;" another begged me to stay away from his

[1] Conditions appear not to have changed essentially since Billroth published his caustic *Aphorismen* in 1886. "How do the young folks pass their examinations? Why does n't one reject all who know nothing?—Easy to say, but hard to do. Most students don't go to lectures: they are coached both for questions and the operations on the cadaver. At the bedside it 's a gamble, and there indeed many a one falls. . . . I am known as a mild examiner. When I ask questions bearing on my own views, or my own operative methods, I make the dismal discovery that most of these gentlemen have not attended my clinic or don't care to accept anything from me. . . . Then again, throughout the semester I examine weekly 10 or 12, sometimes 20, besides conferring with some 50 or 60 at the close of the semester on the subject of fee exemption. One simply can't be always equally severe; one is bodily and mentally worn out." *Aphorismen*, pp. 22, 23 (Wien, 1886). (Slightly condensed.)

[2] "Thatsächlich artet gerade das Examen in der Botanik vielfach zu einer rein formellen Farce aus." *Einführung in das Studium der Medizin*, p. 41 (Berlin, 1899).

examination on the ground that he was ashamed of the showing of some students whom he passed. I witnessed a successful examination in operative surgery, in which the professor took the instrument from the fumbling student and himself carried out the procedure he had asked for; an oral in pathology in which a successful candidate gave not one complete answer. On another occasion I attended the examination of five candidates simultaneously in anatomy, in the presence of over one hundred witnesses. Of the five, three were set to work dissecting, one was studying a special preparation, the fifth was undergoing his oral examination. The quizzing was severe and perhaps somewhat too urgent; the dissections were mercilessly criticized: the results were uneven, a woman student making a particularly poor showing. Quite regardless of the result, the performance must have been a wholesome stimulus to the onlookers. How far the outcome is actually determined by the practical test, it is impossible to say; no one knows. As the system is now worked, almost anything may happen. A brilliant young Berliner admitted to me that he had shirked practical surgery, obstetrics, and gynecology without consequences to his examinations; he was now spending eight months of his practical year in the chemical laboratory of a children's hospital. I do not mean that these are fairly representative experiences: but they serve to establish the fact just mentioned, namely, that the examinations lack uniform or general character. Subjected to no central supervision or inspection, they vary enormously from one university to another and within each. Students are experts on this point. Not infrequently, migration is calculated so as to bring the student at the close of his course to a university with an established reputation for "sweet reasonableness."

None the less, students are undoubtedly often rejected in this subject or that,—occasionally a second time: on the third trial they always pass! The practical protective value of the examination is, as a matter of fact, thus weakened by what is apparently its most effective provision. At the critical moment when an incompetent could be finally cut off, the barrier is lowered and he is invariably allowed to get over. The explanation is easy: men hesitate to accept the responsibility of forbidding a particular career. A faculty dean in one large university defended the custom of final passing on the ground that no professor knows his students well enough to make himself responsible for a fatal check. Undoubtedly many incompetents drop out on the march: they lack staying power or patience; delay sifts; but if they persist, they are sure to pass! I searched everywhere for examples of students who had been rejected on the third trial; I discovered practically none. One Berlin professor had a vague memory of two instances in his twenty years' experience, but could not be sure that they had finally and irretrievably failed; the chairman of the examination commission in another, during an epoch in which seven hundred students were examined, recalled one failure on the third round. In Austria, the Emperor would on application grant such an unfortunate another chance—or more. The dean at Vienna recalled two instances: one, urged to withdraw as unfit, at length complied—"not exactly a failure;" the other continuing to fail despite imperial intervention at length desisted. But, except in such rare instances, persistence wins. These results assuredly constitute no argument for examination by teachers alone: they contrast sharply with those of the legal examinations, in the conduct of which outsiders take part, in consequence of which the mortality is reported to be considerable. Significantly enough, medicine is occasionally the haven of refuge for a disillusioned student of jurisprudence!

The defects of the examination bring out once more the defects of the curriculum in so far as the prescriptions of the curriculum are dictated, not by educational, but by economic or historical considerations. Prescription cannot be effective unless courses are prescribed because they are essential,—unless the curriculum and the examination concur as to what they regard as important. The courses assiduously pursued must tally with those prescribed and paid for. Under the present arrangement, courses are prescribed in order that the professor may get an income. It is well understood that many of the required courses may be and will be systematically cut. The natural significance of prescription is thus almost inverted. The student must pay for legal medicine; a receipt is the only certification required; there is no examination. Other professors are directed indeed to question on the topic. But they rarely do; nor would they venture to reject a student for failure in a subject in which they have no concern. The specialties—pediatrics, dermatology, etc.—are in some cases similarly handled.[1] The examination is so incidental as to be negligible; certification is equally a matter of form. Assurance is thereby lacking at every point. Unfortunately, as long as teachers—mainly *ordinarii*—are sole examiners, they will probably stand together in defense of the present system. It is not without significance that at this moment criticism comes almost altogether from the side of the general public and the practising profession.

Can the system above described be fairly denominated a one-portal system? It is indeed a state examination controlled by regulations that bind the entire empire. But the actual standard of performance required may vary for and within each university. The unity and uniformity supposedly making a one-portal system are attainable only through central representation or oversight. As matters now stand, on the professional side, one might plausibly reckon as many portals as there are universities employing diverse standards. The system has indeed but one portal as to matriculation. Gymnasial graduation under the centralized German system bears a definite value: every graduate in medicine starts from that precise point.

I hold this precision and elevation of the starting-point to be a fact of enormous importance—probably the main fact—in determining the quality of the German product. Defects enough have been cited. But it does not follow that the level of German medical education is low. In the first place, the gymnasium interposes with the assurance that every German student of medicine is an educated man. It may

[1] Wherever an ordinariate is lacking, as a rule.

well be that the elimination of the unfit through this unbending requirement is the most important single fact we have encountered. The student is mature, intelligent, and disciplined; and as the advantages from the standpoint of medical education of the real gymnasium over the humanistic gymnasium are more fully appreciated, the preliminary discipline will be better and better adapted to the proposed superstructure.

Other forces also operate strongly to make the product better than the system as it looks when inventoried. The university student lives in an atmosphere of ideas, and ideas stimulate and coerce. He is therefore something more than his positive possessions; a certain subtle and incalculable driving force must be added in. Against a lack of practical skill, a turn for ideas makes no small counterweight. Finally, for such as reach practice only after serving as assistants, this unique experience must be reckoned in with their education. Statistics unfortunately fail again. Estimates as to the percentage of those that go directly into practice vary widely; it is rated now at 50 per cent, now at 80 per cent. The assistants at any rate have enjoyed an unexcelled practical opportunity; and as subsequently they scatter through the empire, their influence in elevating the profession above its education is not to be overlooked.

Summed up, the outcome of this already too lengthy chapter may now be stated as follows. In the training of doctors no single precaution is alone efficacious. Great as is the importance and retroactive effect of the examination, it must not be overweighted. Other safeguards must be added, to correct its defects, to relieve it of total responsibility, to prevent serious consequences, in case it is loosely administered. These safeguards we are now in position to specify: a definite and adequate basis of matriculation, proper facilities, a trained and devoted teaching staff, and a curriculum which, while in its general arrangement representative of the elements that medicine involves in their proper mutual relations, encourages the student to develop the highest possible degree of individual interest and initiative.

CHAPTER XI

CURRICULUM AND EXAMINATIONS: GREAT BRITAIN AND FRANCE

At first sight, the British medical curriculum appears to resemble the German in elastic quality; for an inspection of school calendars fails to discover anywhere a closely articulated prescribed course of study, although in practice, laboratory and clinical branches tend to constitute two mutually exclusive groups of subjects. The student usually completes his work in anatomy, physiology, etc., before taking up the clinical branches.[1] In dealing with the former division, the English student probably follows more closely than the German the natural order suggested by the relations of the subjects to one another: physics, chemistry, and biology are generally finished before anatomy and physiology are attacked. Nevertheless, a rigid sequence is not universally enforced. On the clinical side especially, as we shall observe, considerable diversity is found. The teaching method employed—that of filling hospital posts—requires indeed marked variations in order that the entire student body may be at all times distributed through the hospital.

It does not follow, however, that the English and German curricula fundamentally resemble one another. As a matter of fact, such is not the case. In Germany, freedom is valued because, avoiding uniformity of content or fixity of order, elasticity is favorable to the development of individual interest or capacity. As against such internally motivated assertion, the elasticity of the British arrangement amounts practically to nothing more than an option, arbitrarily exercised by the student, to elect one of several possible curricula, not materially different from one another, all equally definite as to content and not significantly variant as to arrangement. British elasticity does not connote a large and breezy spirit in the schools; it signifies only the existence of a variety of examining bodies, each competent within limits to define its own policy. Strictly speaking, the several schools themselves are committed to no particular policy. All schools stand ready to train candidates for any or all qualifying

[1] If these divisions were everywhere absolutely maintained in such wise that the required periods of study of the medical sciences could be counted only from the date of passing the preliminary sciences, and the required periods of study of the clinical subjects could be counted only from the date of passing the medical sciences, a "block" system would prevail. This is not, strictly speaking, anywhere the case, though the Conjoint Board closely approximates it. The Conjoint Board requires that two of the three preliminary sciences be passed before the study of anatomy and physiology is recognized—not quite a perfect block; but the Board maintains a complete block as between the medical sciences and the clinics, for it does not count clinical study as beginning until anatomy and physiology have been passed. The Society of Apothecaries of London makes no attempt to enforce the proper sequence between the preliminary and the medical sciences, permitting the latter to be passed before the former, if the candidate so pleases. Although no candidate is admitted to the clinical examinations before passing all the science examinations, no stipulation is made as to the length of time which must elapse after passing in the sciences before coming up for the clinical subjects. Obviously, "blocking" under these conditions is very faulty. In view of the general preference for the Conjoint Board examinations, the statement in the text fairly covers the existing situation. For further variations, the regulations of licensing bodies and the calendars of the universities may be consulted.

bodies. The decisive factor as to which shall be sought is irresponsibly contributed by the student and unquestioningly accepted by the school. The choice made, the curriculum is at once cut to suit: the arrangements are pliable in the sense that every school must be put together loosely enough to facilitate certain adjustments, never very extensive in character; but as the work of each student is at once ordered according to the specification of the particular examining corporation to which the individual in question has chosen to apply for qualification, elasticity is employed almost wholly for the purpose of keeping performance to the minimum required by the licensing bodies. In the United Kingdom there are twenty-four such bodies, their requirements differing in certain respects. As a rule, the universities train men chiefly for their own examinations; the London schools instruct a somewhat more varied clientèle,—candidates for the Conjoint Board diplomas, and the London, Cambridge, and Oxford degrees. Each of these qualifications is a definite thing. The schools must be extensive enough to include the maximum variations. But so ingrained is the habit of conforming to the stipulations of the qualification selected that only in very rare instances would a candidate for a lesser, undertake a task attached only to a more difficult, qualification. In spirit and content the curriculum approximates the fixed curriculum.

As in Germany, the content is indirectly specified, — by the supposed necessities of the examination, not by the schools acting on their own educational responsibility. The regulative apparatus in Great Britain is professional as contrasted with Germany, where it is governmental. The General Medical Council, a body consisting of thirty-four representatives, one from each licensing body, five designated by the crown, and five chosen by universal suffrage by the registered practitioners, was originally set up—as I have already briefly mentioned—for the purpose of keeping the medical register, but has procured important supervisory influence in virtue of the statutory right to inspect the qualifying examinations. It cannot mark out a curriculum or overhaul a school. Over neither school nor qualifying body does it possess direct compelling power. It can at most visit examinations and demand information as to the requirements of the several corporations. In the event that such observation or information discloses unsatisfactory conditions, the Council can resort only to publicity and to protest,—publicity in its own publications, protest to the delinquent corporation and, if necessary, to the Privy Council. The licensing bodies thus actually determine the course of study. Whether acting on their own motion or at the instigation of the General Medical Council, whatever they require for examination, the schools are bound to teach. In dealing with licensing bodies, inclined to laxity, the Council has influence rather than powers;[1] but its influence has proved distinctly effective. For, while it can in no case refuse to register individuals certified as passing even by bodies to whose examination it takes exception, in practice the diploma of a body that has incurred the displeasure of the Council suffers a heavy market discount. The minimum course of study which the Council now countenances lasts five years and contains the

[1] *Address on General Medical Council*, by Sir Donald MacAlister, *Lancet*, October 6, 1906.

following subjects: (1) physics, (2) chemistry, (3) elementary biology, (4) anatomy, (5) physiology, (6) materia medica and pharmacy, (7) pathology, (8) therapeutics, (9) medicine, (10) surgery, (11) midwifery, (12) vaccination, (13) legal medicine, (14) hygiene, (15) psychiatry.

The Council makes only one recommendation as to arrangement, viz., that the subjects numbered (7) to (15) shall occupy a period of not less than twenty-four months after the passing of anatomy and physiology, a recommendation not as yet universally concurred in by the qualifying corporations; but it urges the conclusion of all systematic work by the close of the fourth year, so that the entire fifth year may be devoted to clinical work. Further regulations are introduced by the varying stipulations of the several licensing bodies: in general, the practical outcome results in devoting the first year to the basic sciences, the next eighteen months to anatomy, physiology, and pharmacy, the remaining two and a half years to the clinical subjects. With the details of the divergences as well as with the disturbances due to retardation we shall deal presently.

Of the twenty-four examining bodies in the United Kingdom, to which the state has delegated the right to bestow the practice license, fifteen are universities whose degree constitutes a legal qualification, the rest being either professional corporations, like the Society of Apothecaries of London and the Apothecaries' Hall of Dublin, or associations of corporations, such as the London Conjoint Board, representing the Royal College of Physicians of London and the Royal College of Surgeons of England, or the Triple Board of Scotland, including the Royal Colleges of Physicians and Surgeons of Edinburgh and the Royal Faculty of Physicians and Surgeons of Glasgow. It is to be remarked that the degree of doctor of medicine is not an essential part of the qualification to practise in either Germany or Great Britain, though the degree in question always includes the practice license: the degree is, as such, a high academic distinction, carrying with it the practice right. But it is not necessary to the practice right: in Germany the *praktischer Arzt*, and in Great Britain the holder of the Conjoint Board or Triple Board qualification, practise medicine with full legal right, proceeding subsequently to the degree of M.D. or M.B. only if they care to do so. In Germany, the distinction between the two titles is merely formal, for all medical education is university education; in England, the distinction is still significant and likely to become increasingly so, as university education in medicine more fully attains its proper character.

Much the most popular of the different qualifications in Great Britain is that of the Conjoint Board of the Royal Colleges in London,—so much so, that a very large percentage of those who hold the university degree of M.B. or M.D. pass the Conjoint Board examination also, in order thus to become members of the two ancient corporations.[1] Out of 672 registrations in England in 1901, 484 were Conjoint Board

[1] In consequence, the following figures count some names twice, since a Conjoint Board diploma and a university degree are often awarded to the same person.

diplomas; out of 652 in 1905, 418; out of 494 in 1910, 323; during the same years, the Apothecaries' Society of London qualified 113, 50, and 49, respectively; London University, 128, 112, and 108;[1] Cambridge, 88, 70, and 59; Manchester, 64, 52, and 25. In Scotland, the university degree is the more general qualification; in 1901, Edinburgh granted 193, Glasgow 107, Aberdeen 51 degrees, a total of 351, as compared with 172 qualifications of the Triple Board; in 1905, the universities qualified 354, as against the Triple Board's 144; in 1910, 441 as against 87.

The requirements of the London Conjoint Board may by common consent be fairly taken as indicating what is generally regarded as at once an attainable and a satisfactory level. The curriculum of a student expecting to qualify before it falls into three parts, the contents of each minutely specified:

Part I includes chemistry, certificates of not less than 180 hours of instruction and laboratory work being required, physics with certificates of 120 hours, biology (120 hours), and pharmacy. Synopses indicating the range of the examinations are furnished. Two of these three subjects must be passed before any subject of Part II can be started. It is obvious that as far as Part I is concerned, the curriculum, what with specified subjects and a synopsis in each, is for all practical purposes rigid and prescribed. Nor, it may be added, is it easy to see how, as long as medical education rests on the elementary basis previously described, this can be avoided.

Part II includes anatomy and physiology, for the latter a synopsis being furnished. Certificates must be presented showing the dissection of the entire body in not less than twelve months, anatomical lectures during six months, lectures in physiology, and a practical course in physiology and histology covering six months. Both subjects must be passed together.

At least twenty-four months must elapse after successful completion of Part II before a candidate is admissible to Part III—the final examination. Before admission he must produce evidence:

I. Of having attended at a recognized medical school the following exercises:

(*a*) Lectures on medicine, six months.

(*b*) Lectures on surgery, six months.

(*c*) Lectures on midwifery, three months.

(*d*) Lectures on pathology, including practical instruction in histology, bacteriology, and clinical pathology, six months.

(*e*) Lectures on pharmacology and therapeutics, three months.

[1] It is estimated that not exceeding one-third of the London students have matriculated in London University and expect to obtain its degree. The rest are "Conjoint men." This has an important bearing on the reform of medical education in the metropolis. If university education means a specific thing, the one-third above mentioned ought to be in a genuine university medical department, the two-thirds somewhere else. At present, they all attend the same mixed schools. As secondary school facilities improve, the two-thirds will die out, the one-third increase till it includes all the medical students in London. When that contingency arrives, the university will require adequate facilities; just now it needs facilities adequate only to the one-third.

(*f*) Lectures on legal medicine, three months.

(*g*) Lectures on public health.

(*h*) Systematic practical instruction in medicine, surgery, and midwifery.

II. Of having attended at a recognized hospital:

(*a*) Practice of medicine and surgery during two winter and two summer sessions.

(*b*) Post-mortem demonstrations during twelve months.

(*c*) Clinical lectures in medicine and surgery during nine months each.

(*d*) Twelve clinical or other lectures with practical instruction on diseases of women.

III. Of having served as medical clerk and surgical dresser for six months, at least three of them in the wards.

IV. Of having served a three months' gynecological clerkship.

V. Of having received instruction in anaesthetics.

VI. Of having received clinical instruction in ophthalmology during three months.

VII. Of having attended a fever hospital, a lunatic asylum, and of having conducted twenty labors and received instruction in vaccination.

Subject to the filing of certificates vouching for this elaborate bill of particulars,—a by no means formal affair, for class records are kept,—the student is examined in medicine (including medical anatomy, pathology, pharmacy, therapeutics, and public health), surgery (including pathology, surgical anatomy, and the use of appliances), and midwifery. A good deal of latitude prevails as to the order in which the subjects included in the final examinations are studied,—due to the fact, already pointed out, that, as practical instruction involves appointments limited in number, no fixed order can be followed. Still, precautions are everywhere taken to insure a preliminary course in physical diagnosis before beginning clinical medicine, and a preliminary experience with surgical out-patients before entering the surgical wards. As bearing upon the question as to whether the inauguration of participative instruction necessarily results in a rigidly articulated system under which migration of students would be practically prohibited, it is worth noting that in England the variation of order is greatest precisely in the clerkships, dresserships, etc., in which participative instruction is most highly developed.

Certain variations as to the time requirement in different subjects should be specified as indicating the fashion in which the several qualifications vary. London University students are required to devote their first year to the basic sciences alone; others occasionally begin anatomy in that year also; London University insists on one and a half years of anatomy and physiology; one suffices elsewhere. London and Conjoint men are required to show one hundred and eighty hours of physics; those who qualify before the London Apothecaries may get physics incidentally with chemistry. Six months of practical physiology at the two former shrinks to three at the latter.[1] Cambridge and Glasgow insist on three years of clinical work; two are elsewhere demanded. But the longer periods are themselves completely consumed in additional routine. They are not to be construed as implying larger and freer opportunities here or there for the more forceful student. As between Conjoint and University students in London, the differences in the required curriculum are practically negligible; the differences in the severity of the examinations are met by somewhat harder drill. Coaching to pass is the fatal blight. The schools are too solicitous for success to encourage any one to take chances with his fate, by indulging a marked predilection at any one point: the school knife spreads him evenly over the entire conventional surface. If required work leaves an odd hour here or there, tutorial drill is inserted by way of making assurance doubly sure. The English plan offers a number of ways of utilizing the student's time, no one of them including any allowance for idiosyncrasies.

Pathology is perhaps the most important variable. London University and the Conjoint Board definitely require six months; at the Society of Apothecaries the subject has no independent standing: it figures incidentally in each of the clinical examinations. Cambridge, however, has taken the position recommended in the foregoing chapter. On forsaking the laboratories of anatomy and physiology for the wards, the student ought, we there urged, to command a certain technique and to be able to think in pathological terms. Percussion and auscultation are important, but not alone sufficient; they enable him to discern abnormalities, not to understand them; meanwhile he observes a discrete series of cases; hears from the very first much discussion of inflammation, degeneration, hypertrophy, atrophy, tumors, exudations, etc. To build up these concepts out of an experience otherwise swarming with novelties is doubtless not impossible; but it involves enormous waste through readily avoidable confusion, perhaps, too, no little danger of permanent muddiness. By way of insuring a general grasp of pathological principles which will afford sufficient illumination from the start, and serve, too, as an apperceptive basis to be intelligently and systematically enriched day by day, Cambridge inserts an intermediate examination between the fundamental sciences and the clinics. With a view to this examination, some twenty-five lectures on the principles of pathology are given, somewhat less on bacteriology, with fifty or sixty hours of practical work in the two subjects. The final examinations in general and special pathology being still retained, the student is constrained to build out, not rest content with, his introduction to the field.

The more orderly aspect of the English as compared with the German curriculum is obviously attributable to several causes: the much more definite constraint of examinations, prepared for by syllabi or in their spirit, and the lack of such optional offerings on the part of the schools as would tempt the student to digression. But even should these two factors be altered, the practical nature of the instruction makes for simplicity and coherence. A course of study in which definite laboratory, clerking,

[1] For tabular exhibit see Sprigge, pp. 170, etc. In greater detail, a report issued by the General Medical Council, May, 1908.

and dressing duties figure prominently, naturally arranges itself in reference to the hours of the day. Congenial and imperative engagements involving real responsibility give the day a backbone; not even a student makes two appointments for the same hour, if they require that he be on the ground and take part. With lectures it is different: by distributed attendance, he can keep several sets going at the same hour, as German experience shows; on occasion he may omit all.

The minimum length of the curriculum is five years; the General Medical Council will register no diploma representing less; to this minimum the examining bodies all adhere, excepting only the University of London, which insists on a statutory minimum of five and one-half years.[1] Exceedingly valuable statistical studies made by the General Medical Council[2] indicate that the average curriculum considerably exceeds the permissible minimum,—in England by two years, in Ireland by one, in Scotland by six months. In 542 English cases investigated in 1906, the average length of curriculum was seven years; in 402 Scotch cases, five and one-half years; in 167 Irish cases, six years. Of 360 students qualifying before the Conjoint Board of London in 1906, less than 11 per cent completed the curriculum in the minimum period (five years), and over 40 per cent had spent more than seven years.[3] In 1908,[4] 14.3 per cent of the Conjoint Board candidates qualified in the minimum period.

Elongation, whether statutory or voluntary, has not prevented, however, continued denunciation of the curriculum as overburdened. Indeed, where retardation is already so considerable, an added year, like a bank deposit succeeding an overdraft, makes no positive impression. The English curriculum has expanded much in content and lost little concurrently by way of relief. Its problem is somewhat more difficult than the German because the inferiority of the student body in point of previous education increases the responsibility of the schools: there is less assurance that on his own initiative the student will repair such gaps as the school leaves. Of the less capable student a large total performance must therefore be demanded.

Relief would appear to depend on elimination as well as on organization. Didactic

[1] Subject to certain exemptions, for which see Calendar for 1910 (pp. 144–174).

[2] The highest praise must be bestowed on the General Medical Council for its admirable statistical studies of every aspect of these complicated questions.

[3] Reports issued by the General Medical Council, November, 1906, May, 1907, and May, 1908. Sir William H. Allchin, testifying before the Royal Commission on University Education in London (appendix to *Third Report*, *Minutes of Evidence*, p. 324), states that 7.3 per cent of English candidates qualify in five years, 28.4 per cent in six, 22.8 per cent in seven, and 41.5 per cent take over seven. According to the same authority, of those who take the Conjoint Board examinations, 8.5 per cent qualify in five years, 33 per cent in six, 24 per cent in seven, 34 per cent take over seven.

Why should the Scotch boy get his qualification in so much shorter a period on the average? In part the difference may be due to the fact that the Scotch students are largely examined (90 per cent) in the institutions in which they have studied, whereas the English boys are generally examined (80 per cent) by a non-teaching body. The English average is closer to the Scotch in the case of boys who are trained in the teaching universities; for example, the course averages 65.3 months at Glasgow, 65 months at Durham. Moreover, the Scotch universities are in closer articulation with the secondary schools, thus eliminating waste. Finally, the absence of the block system operates to reduce the length of the period of study required.

[4] *Report, General Medical Council*, November, 1908.

lectures, already greatly reduced, appear capable of still further diminution, more especially in such subjects as anatomy, surgery, midwifery, materia medica, etc. It is absurd, for instance, to teach materia medica along lines appropriate enough at a time when the leech himself went to the fields to gather medicinal roots and herbs. Were less literal compliance with syllabized suggestions expected at the examinations, tutorial grind could be largely reduced. Again, if clinicians and laboratory teachers were in closer sympathy,—a point to be touched on more fully in a moment,—the various parts of the curriculum would tend to sustain, instead of to displace, each other. Unsympathetic or uncorrelated teaching tends to atomism, of which the extra-mural schools are the best example: lack of interaction involves positive waste.

The transfer of chemistry, physics, and biology to the secondary schools would prove the most important single step. The General Medical Council holds—and doubtless with right—"that the schools of the country generally are not at the present time in a position to take up the work."[1] The Conjoint Board, however, not without encountering the displeasure of the Council, has ventured to accept certificates from recognized secondary schools as evidence of study in these subjects, provided that the student thus admitted spends at least four and one-half years subsequently in a medical school. Despite the fear in some quarters that the presence of science in the pre-medical period imperils the "schoolboy's opportunities for general education," there appears to be a steady growth of conviction that relief lies that way.[2] The present preliminary requirement can be met at fifteen or sixteen years of age; students enter at eighteen and a half: the intervening period represents the lost years of the average English schoolboy,—a waste due largely to lack of articulation. When they are retrieved, the medical student will know more, he will have less to do, and he will attack his reduced task with increased training and maturity.

Of far greater importance than the statutory length of the curriculum, or the precise details of its content, is the principle upon which an adjustment is to be effected as between the periods allotted respectively to the laboratory and the clinical branches. Both England and Germany concur in demonstrating that adequate treatment of the basic sciences—chemistry, physics, and biology—is impossible within the medical curriculum. Now physiology, pathology, and bacteriology cannot be actively and fully developed except on the sound basis of the pre-medical sciences. It may therefore be wise to conclude that a predominantly clinical type along the current British lines is the best possible solution wherever the pre-medical sciences still remain stepmotherly parts of the medical course of study. Were these sciences, however, adequately taught in the vacant spaces of pre-medical education, the stronger basis of the student and

[1] *Report of Education Committee, General Medical Council,* 1910.

[2] See, for example, Sprigge: *Considerations on Medical Education*, pp. 31, 32 (London, 1910); Schäfer: *The Medical Curriculum*, pp. 10, 11 (Edinburgh, 1903); T. P. Teale: *Need for Reform of Medical Examinations*, p. 17 (Leeds, 1896).

the enlarged opportunity of the medical school would at once raise the fundamental problem respecting the relations of laboratory and clinical teaching.

As to proper adjudication on this point, a tug of war exists generally. A fifth year was added in England in the hope that it would augment clinical study: it "was to be the make-weight that was to compensate for what we have lost in the disappearance of the apprenticeship," etc.[1] It has been captured, however, by biology and the other sciences. How we feel about this outcome depends, I suspect, on the comparative importance assigned to capacity for growth as compared with achievement at graduation. If we value most the ability to engage in practice at once, we shall deplore the rape of the added year by the biologists; if we value more highly the prospect and possibility of growth, our sympathies will perhaps incline in the opposite direction. Which is the more modern calculation?

Medicine is changing with unprecedented rapidity. It has undergone greater changes in the last three decades than in the preceding three centuries,—a rate of speed likely hereafter to be accelerated, not retarded. On what terms can the physician or surgeon participate in progress? To put the same question differently: the utmost practical capacity and judgment attainable at school are in no event huge; as things now move, they are soon more or less antiquated. If a choice must be made between some portion of this positive attainment and markedly greater ability to participate in the developments of medical science, which alternative should medical education prefer?

To ask the question is to answer it. The proved medical possessions of the race are not inherently difficult of acquisition; the skill necessary to their wise employment is slowly obtained, at school and afterward. But every day important diagnostic refinements are suggested; every day new therapeutic agents or procedures are proposed,—some out of the fullness of thought and knowledge, others but weakly grounded in either experiment or experience. If discriminating but prompt apperception is desired, then scientific knowledge, interest, and activity are in the long run more important than additional bits of a clinical experience necessarily fragmentary in any event. Partisans of attempted clinical completeness stamp the laboratory emphasis as remote; the student, they urge, needs what is practical. So be it. Confronted by a meningitis of doubtful character, what could be more immediate or more practical than the intelligence to require, and the ability to procure, a differential diagnosis, resulting in the employment of the specific serum appropriate to the case? Development of intelligence of this type is a question of fundamental training, as far as it depends on training at all. Routine clinical education of the empiric type tends the other way. The fact is, that the rapid progress of medical science has necessarily changed the rôle of the medical school: a substantially stationary or slowly changing medical and surgical art could be communicated; the level did not appreciably alter in the course of a professional lifetime. A boy who learned medicine at school knew it for the rest of his life. But expanding sciences and the arts dependent on

[1] Teale: *Need for Reform of Medical Examinations*, p. 15 (Leeds, 1896).

them cannot be totally, even largely, imparted in a few months. The greatest service to be rendered the student is in giving him such training as will enable and incline him to keep up and to go ahead.

I have already adverted to the existence of numerous examining bodies in England, of which for practical purposes the most important is the so-called Conjoint Board. Its examinations I propose to describe with some particularity.[1]

The Royal Colleges of Physicians and Surgeons are chartered professional corporations, admission to either of which after successful examination carries with it the license to practise. In 1884, the two colleges which had up to that time conducted separate examinations united to form a Conjoint Board, which conferred a single diploma combining both qualifications. The board is managed by a joint committee, consisting of three representatives from each of the constituent corporations. This committee has general control of the examinations. While itself powerless to change the regulations governing them, it can recommend such action to the colleges. The examiners under the board are appointed by the colleges mainly from the teachers of the London schools. As clinical teachers are also practitioners, the practising profession participates in the examination; it will be observed later that, while the student is thus examined by teachers, he is never examined by his own teachers.

After complying with the general educational requirement,[2] the student is eligible to the series of professional examinations. They begin with chemistry, conducted by two examiners, chosen in rotation from the staff of the London schools. The examination is both written and practical: in the former, nine questions—five on inorganic, four on organic, chemistry—are propounded, and not less than six must be answered within three hours. The examiners coöperate in marking papers. Three days later, the practical examination takes place in Examination Hall. Two examiners with assistants can handle eighty candidates in one batch. In case of doubt as to a candidate's passing, *viva voce* methods may be employed to resolve the difficulty.

Physics is managed on the same lines, excepting only that the groups are smaller (15 to 20), and the candidates are quizzed as they proceed with their experiments, supposed to occupy about an hour. In biology, substantially the same procedure is followed. The practical and written marks are combined to determine the grading.

In anatomy and physiology, four examiners apiece are named. They work in pairs, all being continuously engaged. In the written part, eight questions are set in each subject, of which six must be answered within three hours on consecutive days. Failure in the written portion estops the candidate from even trying the practical or oral examination, two or three days later. In anatomy, the oral is conducted on a freshly dissected subject, dissected specimens in alcohol, and on bones. A living model is used for surface anatomy. In physiology, no experiments are performed, but apparatus,

[1] For the details here given and for permission to attend the examinations while in progress, I am indebted to the courtesy of Mr. Frederic G. Hallett, secretary of the London Conjoint Board.

[2] See chapter iii.

diagrams, and histological slides are employed as basis of the questioning; simple experiments in physiological chemistry must be carried out, however. Four candidates enter the room at once, two going to each pair of examiners. Assuming that one pair of examiners consists of teachers from Guy's and Charing Cross, a student coming up from the former would be quizzed by the latter. The *viva voce* examiner never marks the same student's written paper. Thus two independent judgments must concur. After fifteen minutes, the students change, those who have tried physiology now trying anatomy, and *vice versa*. Twenty-four candidates are handled in the morning at the rate of eight per hour, and an equal number in the afternoon. At the close of the session, the examiners meet and enter their marks: students who have passed in both subjects are accounted satisfactory. If a candidate is slightly above in one subject and slightly below in another, the examiners may in their discretion pass him, otherwise he fails; and failure involves both subjects, for the board refuses to credit physiology without anatomy, or *vice versa*.

Eight examiners officiate in medicine; they act in pairs, designated A, B, C, D, respectively, so arranged that, for example, pair A will consist of teachers from St. Bartholomew's and Westminster, pair B of those from St. Thomas's and St. Mary's, etc. The candidates are so distributed that no student is examined by a teacher from his own school; moreover, the written and the clinical examinations of a given student are never both conducted by the same pair. Teachers,—not the student's own,—and several of them together, pass on the merits of each individual: summary and partial judgments are thus both ruled out.

Two written papers are set in medicine, one consisting of six questions, the other of five: they are answered on consecutive days, three hours being allowed for each. Every paper is read and graded by each of the two members of the pair to which it is sent. The practical or clinical examination takes place in the Examination Hall, temporarily converted into a hospital ward. Each examiner sends from his hospital at least three patients (male or female), who are remunerated, so that for each day's examination at least twenty-four patients are present. Every candidate is examined on one "long" and one, two, or three "short" cases. For the "long" cases, four candidates enter the room, one going to each pair of examiners. A candidate examines an assigned patient for ten minutes; at the conclusion, he is quizzed by one examiner, while the other listens. Thereupon the second examiner questions him on two or three "short" cases, while the first stands by. During this latter period a second set of four candidates are engaged on the examination of their "long" cases. Fifteen minutes are allowed for prescription writing. The process described runs on for two hours and ten minutes, during which twenty-four candidates will have been disposed of: each will have had thirty minutes' examination by two teachers. On the evening of the same day, the twenty-four are orally examined in medicine and medical pathology, including the examination of urines, pathological slides, gross pathological specimens, fresh or preserved: three periods of ten minutes each are allowed to every candidate. By the same sort of overlapping previously described, the entire group is rounded up between 7.50 and 10 o'clock.

In midwifery, including gynecology, eight examiners likewise participate, under similar conditions and precautions. The written examination consists of six questions, four of which must be answered satisfactorily. Twenty minutes are given to oral examination: between 7 and 9.40 in the evening, thirty-two candidates are handled.

Ten examiners act in surgery. The examination is divided into five parts, and each candidate is examined by each of the five sections. The examiners, selected from the schools, are arranged as follows:

Section A. Mr. —— (from Guy's)	Mr. —— (from St. George's)
Section B. Mr. —— (from University)	Mr. —— (from King's)
Section C. Mr. —— (from Birmingham)	Mr. —— (from Middlesex), etc.

The examination consists of (*a*) written paper, (*b*) clinical or practical work, (*c*) surgical anatomy, (*d*) and (*e*) pathology (two parts). Each examining pair does some work under each of these topics. The following table shows that such serial distribution is readily feasible:

Candidate No. 1 goes before Section A for his written examination;
before Section B for his clinical examination;
before Section C for his surgical anatomy examination;
before Sections D and E for his pathological examination.
Candidate No. 2 goes before Section B for his written examination;
before Section C for his clinical examination;
before Section D for his surgical anatomy examination;
before Sections E and A for his pathological examination, etc.

Once more, a candidate is never examined by a teacher from his own school, for as the examiners are always present in pairs, candidates are so numbered and assigned as to avoid this contingency.

The written examination follows the model already described. For the practical or clinical examination, the Hall once more serves as a ward: as every examiner sends three patients, thirty are utilized, ten of them as "long," twenty as "short" cases. Five candidates enter at a time, each examining two "long" cases for fifteen minutes. Thereupon each candidate goes before the five examining sections in succession, being quizzed by each for five minutes on the "long" cases and for ten minutes on three or four "short" cases. As soon as the first set of five candidates, having finished their private examination of their "long" cases, appear before the examiners, a second set enters. At the conclusion, the five candidates constituting a set repair to a table, where each finds a microscope and slides, two of which latter he is required to examine and to expound in writing. In the evening of the same day, the examination in surgical anatomy, bandaging, instruments, etc., is held on the living model. Forty-five men are handled in two and a quarter hours. On the following day, these forty-five are examined in pathology *viva voce* in the museum of the Royal College of Surgeons. Five tables are supplied with specimens; at each table two examiners sit. Every candidate has ten minutes at each of two tables. On the completion of the examination, the examiners assemble as a court; the successful candidates appear before them to be formally introduced and to sign the by-laws of the ancient college to which they are now admitted. No candidate receives the license of the Royal College of Physicians or the diploma of the Royal College of Surgeons until he has passed all examinations without condition.

The examiners are selected by the two colleges for periods of four or five years. The service, requiring several days at a time, three or four times a year, is obviously a severe one, but, to the credit of the profession be it said, the ablest and busiest men in the kingdom regard it as at once a duty and a privilege to serve; and that, too, not only in the metropolis, but in the provincial universities, in whose examinations outside assessors are regularly invited to participate. The fees paid for the service are too small to constitute the main or even a strong inducement. To insure fairness, the written questions are determined on in conference, and may even be revised by the committee in general charge. The pairs shift at intervals of six months, so that the examiners, becoming acquainted with one another's procedure, may maintain an equality of standard. And this level is more or less diffused, since men who serve now the Conjoint Board and now the Apothecaries may subsequently be called as assessors to Oxford, Cambridge, Leeds, Manchester, or Edinburgh.

From the Conjoint Board examinations above described, the examinations conducted by the other professional corporations do not differ essentially: they are all alike "external" examinations,—examinations, that is, conducted apart from the institution in which the student has been trained. The university degree examinations in medicine, carrying with them the practice license, are, on the other hand, "internal" examinations; and yet not simply that, for while the student is examined in the school where he has studied, an outsider participates as assessor.

I have taken occasion to object seriously to external examinations at the secondary school stage on the ground that they convert teaching into drill. Undoubtedly, external examination at the professional stage, if unintelligent, can be equally harmful. But the cases are not quite analogous. A mature individual whose medical training is complete, and who is about to embark in practice, may be fairly required to possess resourcefulness and self-possession enough to convince disinterested outsiders in the teaching profession that he has attained a certain minimum amount of knowledge and skill. If the scope of the examination is determined by teachers, if the examination is conducted by teachers, and if all the factors that determine the result are viewed together, an external "pass" examination at the professional stage ought not to demoralize the student or unsettle his instructor.

In point of severity, the various qualifying examinations do not greatly vary. The London University degree is reputed the most difficult qualification: matriculation is higher, the science requirement more prolonged, the clinical tests somewhat more exacting. The provincial university degrees and the Conjoint Board diploma are probably not greatly dissimilar; in England, at least, the Scotch university degrees are supposed to be somewhat easier. That the qualification of the Triple Board of Scotland or the Apothecaries' Society of London represents a somewhat inferior performance is hardly disputed. Finally, the license of the Apothecaries' Hall of Dublin oscillates so closely to the minimum line that it has gone now and then a bit below it.

These discrepancies are generally regarded as undesirable, and forty years ago a movement to establish a one-portal system all but succeeded. Theoretically, the plan is still strongly championed, but vested interests, corporate, individual, or educational, block the path. The General Medical Council is, however, not unsuccessful in maintaining the definite minimum which is perhaps all that the one-portal system contemplates; for it is not proposed in any event to wipe out the variety of degrees, diplomas, and fellowships which go further. That is, even under a one-portal system, the student, having once obtained the necessary state qualification, will still be tempted to win a university degree, a corporate membership, or fellowship by submitting to further examination on terms fixed by the body whose diploma he covets. The single state qualification could undoubtedly be more easily protected than the present multiplicity; better still, it would lend itself to more ready manipulation in response to rising or changing demands. A new departure, once approved, could be more speedily incorporated in the regulations, if it did not have to run the double gamut of ancient corporations and modern universities,—for to conciliate both is assuredly no easy matter. Nevertheless, one suspects that the one-portal system would make less educational difference than is expected, unless its establishment coincides with a modification of the national predilection for examining and getting examined. At this moment, English medicine is less demoralized by the competition of examining bodies than it is diverted from inspiring ideals by examinations as such. A strong case for the necessity of the one-portal system could now be made out only if experience showed that candidates tend to seek qualification at the cheapest counter; or that the large numbers rejected by the more exacting bodies enter the profession nevertheless by a back door in the form of an easier qualification. There is good reason to think that this happens only exceptionally. The commercial value of the easy qualification is too low to make it worth while. Hence, despite the large number of rejections by the Conjoint Board, registration through the Apothecaries' Society of London has decreased from 113 in 1901 to 49 in 1910; through the Apothecaries' Hall of Dublin, from 8 in 1901 to 3 in 1910.[1] In Scotland, the universities registered 351 in each of the two years in question; the Triple Board, 172 in 1901, 87 in 1910.

[1] The Conjoint registrations in the same years were 484 and 323, respectively, whereas the totals in England were 672 and 494, respectively; the Scotch totals were 499 and 397, respectively.

These statistics indicate that such variety as now exists is not acutely demoralizing: in the first place, the minimum existing qualification is not dangerously below the standard that a one-portal system would set up; in the second, the higher professional value of a respected qualification is so well established that no large percentage of candidates entertain any other. The real mischief of the present situation—a mischief which the single portal does not touch—is the competition of qualifications obtainable only after examination that succeeds the act of satisfying the law. Having won the Conjoint diploma which entitles to practise, the student now indulges the higher ambition for the London degree, a fellowship of the Royal Colleges of Surgeons, or what not. If the establishment of the state qualification leaves this tendency unchecked, no great improvement need be looked for. As long as titles, diplomas, and distinctions depend on conscientious acquisition of the known, testable by examination, rather than on productive individual performance, British medicine will continue to be respectable rather than inspiring or stimulating.[1]

I have intimated that the supervisory activity of the General Medical Council has been an important factor in establishing and preserving the educational minimum. Its two visitors—one a member of the Council, the other an outsider appointed as inspector—attend and report upon examinations, separately or jointly. They note the facilities provided, the time allotted, the quality of question and answer in the oral tests, read papers taken at random, comparing their mark with that actually given, and witness the conference at which the final marks are agreed upon. The report of the visitors is communicated to the inspected corporation and printed in the proceedings of the Council. Entire candor characterizes these utterances. The inspectors at the Conjoint Board in November, 1903, praised highly the admirable arrangements made for the examinations and the excellent collections of cases provided for the clinical tests in medicine, surgery, and midwifery. They regretted that written reports of a medical and surgical case were not required, deplored strongly the absence of a practical examination in operative surgery, and denounced as "puerile" a substitute therefor, consisting of "pantomime" imitation of operative procedure by means of "dummy knives of wood" on the body of a living person.[2] About the same time, a detailed report on the Apothecaries' (London) examination commends the care, thoroughness, and fairness of the ordeal in general, but remarks significantly that in midwifery "there was also a 'phantom' on a side-table, which we only once saw made use of."[3] The inspector of the examination at Cambridge in 1902

[1] The establishment of the single portal brings up the question of the value of external examinations, since a single portal state examination would, like the examinations of the Conjoint and Triple Boards, be conducted apart from the institutions in which the candidates were trained. Those questions have in Great Britain a quite factitious importance, because they are involved in problems touching vested interests, traditions, etc. But the vital question there at this time is education, not qualification or examination. If British medical education is ultimately to be placed on a university basis, the one-portal problem would better be postponed until that evolution has been accomplished, rather than be unsatisfactorily solved in a time of transition. It will be a different and simpler problem later.

[2] *Report*, November, 1903, passim. [3] *Ibid.*, p. 16.

reports in reference to pharmacology that the answering of the majority of the candidates he heard was poor: of one candidate in particular his examiners remarked that he was "a poor man and that it was doubtful whether he should pass. But he did."[1] Of London University examination in the same year, the visitors object vigorously that in clinical surgery "the time allowed was much too short, no matter how eminent and experienced examiners may be."[2] They call attention subsequently[3] to the failure to comply with the University's own specifications in surgery and obstetrics; to the fact that pathological specimens are not provided, and that the phantom, though provided, is not used;[4] and that in medicine and surgery the written papers are so much overweighted that "a man who has no real practical knowledge of clinical medicine or of clinical surgery may by reading and 'cramming' be able to pass on the marks he legitimately gets for them alone."[5] A report on the Conjoint Board in Ireland in 1902 criticizes the examiner for giving "considerable assistance by the manner in which he put his questions, and for telling the candidate the answer to several of them."[6] Praise, however, is not stinted where it is deserved: the Cambridge examination in pathology in 1902 "was in every respect a most thorough one, and the standard of marking high."[7] An experienced critic pronounces the practical chemistry and practical pharmacy of the Irish Apothecaries in 1903 "unusually difficult; however this may appear to the candidate, it is pure gain to every one else,"[8] though alive to the danger that this may prove "a pretentious fraud."

To the strictures above quoted, replies are generally made,—rather resentfully at times. It is to be noticed that though the Council cannot compel amendment or improvement, its constant hammering tells. A case in point is the Apothecaries' Hall in Dublin. In 1893, the inspectors declared its examination in clinical medicine not only unsatisfactory, but valueless. "The examiner paid no attention to the method of physical examination followed by the candidates; he did not read their case reports; he did not attempt to verify or disprove the statements of a single candidate."[9] From such scandalous conditions it is a far call to the report seven years later, in which the inspector, declaring the test "sufficient," states his conviction that the authorities "are endeavoring to maintain their examinations at a level worthy of the confidence of the Council."[10]

Meanwhile, the examinations themselves are both highly praised and severely censured,—made to suffer for defects in the educational arrangements, and for the defects of examinations in general. The subject is one on which feeling is easily engendered. We may as well begin by conceding that examinations are necessary evils: the state is bound to scrutinize intending practitioners in the public interest. If invariably conscientious teachers moved in sufficiently wide orbits, the function could be dele-

[1] *Report*, 1902, p. 12. [2] *Ibid.*, pp. 11, 12. [3] *Ibid.*, p. 17. [4] *Ibid.*, p. 25.
[5] *Ibid.*, p. 24. [6] *Ibid.*, p. 18. [7] *Ibid.*, p. 16. [8] *Ibid.*, p. 10.
[9] *Report*, November, 1893, p. 56 (abridged). [10] *Report*, 1900, p. 12.

gated to the schools or consolidated with the school examinations. But that plan is not feasible: it cannot be said to work satisfactorily either in Germany or elsewhere. An examination by outsiders alone is perhaps even more objectionable; for if the schools and outside examiners are to understand one another, the examination is practically forced to find its basis in a rigidly prescribed course of study, in the construction of which the notions of a generation passing away are deeply imbedded.

The British solution seems, therefore, in principle a decidedly happy one. The profession governs itself; the examinations represent its pride in its own dignity and competency. Conducted largely by teachers, they avoid a divorce between teaching and examination. Moreover, they promote interaction between the schools and the profession, while demonstrating the feasibility of practically examining large numbers by the combined action of teachers and practitioners. Not only is this principle sound: the arrangements are admirable. The examinations are so concentrated that at appropriate periods the entire devotion of the examiners—laboratory men and clinicians—is obtained; partiality is eliminated without depriving the student of the privilege of judgment from an educational standpoint; the tests are increasingly practical, evasion and vagueness getting short shrift when the student is asked to put

> "*his finger on the spot,*
> *And say, 'Thou ailest here and here.'*"

Finally, the bearing of the examiners is informal, sympathetic, and easy, even to the point of joining in tea with the onlookers who happen to be present when that national function comes due.

Defects the examinations undoubtedly have, but fortunately they do not affect their fundamental merits. They are said to hamper teaching in the underlying sciences; in respect to book knowledge of anatomy they doubtless do, by laying excessive stress on anatomical information. Reform in this matter must begin with the teachers of anatomy, who thus far have made no concerted or emphatic effort to denounce the instruction which the examinations pass upon, and in reference to which the examinations cannot alone initiate a radical modification. Criticism of the examination in physiology is better founded; for teaching so well conceived as that of English physiology is not likely to complain seriously unless there is cause. Some of the objections of the physiologists could be readily met; as, for example, that the written and oral examinations are conducted by different persons, so that, despite the fact that the marks are averaged, the individual examiners cannot view one of the two performances in the light of the other. The brevity of the test and the limited nature of the practical portion are more serious, but hardly irremediable, faults. Undoubtedly all the written examinations are elaborate to the point of forcing a decidedly excessive amount of didactic teaching, book study, and tutorial drill; undoubtedly the examination in pathology represents a too narrow conception of the present place and function of that topic; that in materia medica is well-nigh useless;

doubtless there are too many separate tests. Finally, it is possible that at some points the practical tests are too hurried, so that the oral and written tests count too heavily, —a circumstance of which the London tutors and the extra-mural schoolmasters are not slow to take advantage. These are none of them matters of principle. In part their remedy depends on the instigation of deep-seated changes in the direction of modernizing educational conceptions; in part they are at once remediable by giving the professional teachers already permitted to conduct examinations a larger voice in framing and regulating them.

This is indeed, as I see it, the heart of the matter. The English profession governs and examines itself. But the active governors—those prominent in the corporations—are in the main elderly men, wise, seasoned, and eminent veterans, to be sure, but in large measure veterans still. I have already urged that though examinations may suppress scandals, they cannot greatly accelerate innovations; they may destroy, they cannot create. To get a new point of view into the examination, chemical, pathological, or other, it must first be got into teaching. The ultimate reliance for ideals and intelligence must be on the schools as such, not on the schools acting under the coercion of examining bodies. In England above all must this obviously be the order of procedure. Now the official profession is eminent, dignified, and conservative,—loyal to its past, deferential to the interests of the schools. English medicine is once for all now so constituted; and this constitution is reflected in the composition of the qualifying examinations. A change can be wrought only if a new spirit takes hold of education; it is not likely that stubborn or long resistance to revising the examinations would be made, once a revolution in educational sentiment has been accomplished.

The conscientiousness with which men live up to their present lights is clearly displayed in the generous percentage of rejections. At the Conjoint Board of London in 1894, out of 865 candidates in medicine and 916 in surgery, 42 per cent failed in each subject; out of 831 who attempted midwifery, 32 per cent failed.[1] Before the same body, in the years 1905–1909, 37 per cent were rejected in medicine (total candidates 3279), 45 per cent in surgery (3598 candidates), 28 per cent in midwifery (2957 candidates). Wherever the numbers are large enough to be significant, equally decisive action appears: in 1909, the Triple Board examined 248 candidates in medicine, rejecting 134 or 54 per cent; 263 in surgery, rejecting 142 or 53 per cent; 178 in midwifery, rejecting 57 or 32 per cent; the University of Edinburgh accepted 200 and rejected 62 in medicine, accepted 195 and rejected 52 in surgery; the Conjoint Board of Ireland passed 70 and rejected 41 in medicine, passed 64 and rejected 42 in surgery, passed 86 and rejected 24 in midwifery. At Cambridge, 79 passed and 38 failed in medicine; at London University, in the same branch, 137 and 93, respectively. Glasgow and Durham alone show averages distinctly more favorable: the former in medicine, 103 successes as against 29 failures; in surgery, 103 as against 14;

[1] Teale: *Need for Reform of Medical Examinations*, p. 16 (Leeds, 1896).

in midwifery, 109 as against 7.[1] The latter passed 28 each in medicine, surgery, and midwifery, with one failure in the first, and four apiece in the two others.

What is the significance of these astonishing fatalities? Several factors must be recognized. First of all, they appear completely to discredit the entrance basis. A curriculum has been constructed in some sort representative of modern medicine; it is pursued by ill-trained students, who conspicuously fail to master it. What the examination concedes to be at this moment the legitimate ideal of the medical school is therefore largely unattainable on the matriculation basis at present accepted. But another conclusion seems equally unavoidable. Conscious of the difficulties of teaching modern medicine to untrained youths, British educators have sought to force the impossible by making the student literally and elaborately accountable for every detail of his training. In writing, orally, practically, he is to be compelled to prove himself an adept: thus shall the stream rise higher than its source. With what outcome? When by sheer particularity the examinations endeavor to force an accomplishment beyond the educational competency of the students, instruction is perverted to mere drill, and a rise in the percentage of break-downs infallibly evidences the futility of the endeavor. Of the candidates appearing before all qualifying bodies, 12.4 per cent were rejected in 1861; 16.6 per cent in 1871; 31 per cent in 1881; 39.3 per cent in 1891.[2] I repeat, then, that if everything is expected of the examinations, they will corrupt instruction and disappoint anyway. A good result may be measured by reasonable, not too numerous or prolonged examinations; it cannot be forced by them. That, in the end, depends on antecedent factors, —adequate preliminary training, proper facilities, competent and devoted teachers, and the right atmosphere; and to the provision of these, effort must in the first instance devote itself.

A word may here be in place by way of contrasting the German and English product, as determined by all the factors that have been from time to time enumerated. At graduation, the Englishman is indisputably more dexterous. He handles himself and his patient more expertly. But the German is immensely more likely to be launched with momentum: he has ideas, has brushed shoulders with aggressive workers; he will probably grow. No inherent incongruity between the two disciplines appears to exist. Indeed, neither can fully explicate itself alone: a practical discipline apart from ideas is the discipline of an artisan; a theoretic discipline more or less detached from practice cuts itself off from the most plentiful source of its own inspiration. The German seminary and the German laboratory for advanced workers are types of the stimulating consequences of combining practical with theoretic training: the participation of the student under direction is their keynote. The psychology of undergraduate instruction is not different. What is essentially characteristic of medical education in Great Britain and in Germany is therefore complementary: the former lacks ideas, the latter lacks practice, and either may be grafted on the other. The Germans are concerned for

[1] Document No. 690, General Medical Council (May 24, 1910), pp. 10-14.

[2] *Report on Rejections*, General Medical Council, November, 1893, pp. 11-16.

the better student, the English for the average student, but a well-organized and properly equipped school can provide opportunity for the former without neglecting the training of the latter.

The French curriculum may be very briefly characterized: it is at once simple and concentrated. The preliminary sciences, physics, chemistry, biology, claim the first year. Of the "block" system, which practically reserves the next two for the underlying medical sciences, it knows nothing. Anatomy, physiology, etc., are taught in the afternoons in order that from the first the student may, if he chooses, follow the clinics in the morning; after the first year, he is required to do so. His clinical assignments come in turn, each forming the important feature of a four months' term. The sciences are concurrent with the clinic, not precedent thereto.

The banishment of the sciences to the afternoon continues them in a largely theoretical and distinctly subsidiary form. Discriminated against, they get no real chance. It is not necessary to repeat the objections already urged against this procedure. It is true that surgery lends new interest to anatomy, provided the student has already mastered the elements of anatomy; otherwise, surgery is itself an impenetrable mystery. Precisely the same situation holds as between chemistry and physiology, or between physiology and internal medicine. The French notion is sound in so far as it holds that anatomy and physiology cannot be studied once and for all. The student's work in medicine and surgery repeats and amplifies them. But before he can be clear as to anything he sees and hears in the clinics, he must have previously obtained a fundamental discipline in both subjects, and in pathology as well. There is the added reason that, if postponed, the sciences are permanently slighted. Medical education in France is therefore practically clinical education, depending on the accumulation of impressions which tend in time to classify and distinguish themselves. Clinical assignments come in no fixed order, which is of less consequence than that propaedeutic exercises are not arranged to precede them. The various instrumental procedures, properly antecedent to activity in the clinic, the student picks up haphazard: so conservatively clinical is medical training in France still.

The curriculum extends through five years, thus apportioned:

First year: Chemistry, physics, and biology.
Second and third years: Dissections, two hours daily in winter semester.
    Histology, four hours weekly in summer semester.
    Physiology, four hours weekly in summer semester.
    Biological physics, once weekly in summer semester, second year.
    Biological chemistry, once weekly in summer semester, third year.
Fourth year: Pathological anatomy, four hours weekly in winter semester.
    Parasitology, one hour weekly in winter semester.
    Operative medicine, three hours weekly in summer semester.

Fifth year: Toxicology, two hours weekly in winter semester.
Pathological anatomy, four hours weekly in winter semester.
Bacteriology, four hours weekly in summer semester.
Legal medicine, twice weekly in summer semester.

Clinical appointments occupy the morning hours during the third, fourth, and fifth years, general medicine and surgery in the third and fourth, obstetrics, psychiatry, ophthalmology, and urology in the fifth. The student is left free to follow the clinics in the second year, if he will.

The four years forming the medical curriculum proper are divided into sixteen "inscriptions," the five examinations being fixed in reference thereto. The French student pays his fees every half semester—*i.e.*, four times yearly. Each such payment is called an "inscription." The subjects of a given inscription cannot be passed until those included in the preceding inscriptions have been paid for and passed. This device practically compels the student to pursue his subjects in regular order. The first examination, devoted to a practical dissection and an oral in topographical anatomy, may come at the student's option between the sixth and the eighth inscription; the second, *viva voce* in histology, physiology, and physiological chemistry, between the eighth and tenth; the third, practical tests in operative medicine, topographical anatomy, and pathological anatomy, and oral in topographical anatomy, general pathology, parasitology, and obstetrics, between the thirteenth and sixteenth; at any time after the sixteenth, the fourth and fifth, including therapeutics, hygiene, legal medicine, materia medica, pharmacology, surgery, medicine, and obstetrics. Finally, the student must submit an acceptable thesis.

CHAPTER XII

THE FINANCIAL ASPECTS OF MEDICAL EDUCATION

In the matter of university support in Germany, two facts stand out conspicuously. First, the absolute cost of the universities has mounted with startling rapidity. Two centuries ago, a small dowry sufficed to start a university on its way; the initial outlay at Strassburg in the early seventies — the last German foundation — was upwards of 13,000,000 marks. Twenty years ago, 1891–1892, the annual appropriation of the Prussian government for the operating expenses of its universities reached 10,559,392 marks, of which amount less than one-third was derived from endowments, the rest being appropriated from current funds. In the same year, 3,248,862 marks were expended for purposes lying beyond the expense of maintenance, — construction, for example. Eleven German universities outside Prussia spent contemporaneously 8,342,839 marks for maintenance (less than one-fourth derived from investments), and 1,119,212 marks besides. Important sums devoted to the support of the universities, as we shall see, are omitted from these amounts, which purport to be merely the governmental subvention: nevertheless, in 1891–1892, these aggregated 23,270,305 marks.[1] Fourteen years later, 1905–1906, Prussia alone was spending 15,426,684 marks for the ordinary running expenses of the same institutions — an increase of over forty per cent — and 4,079,205 marks for extraordinary purposes. To obtain the total cost of the universities, one would have to reckon in that large portion of the professorial income contributed by student fees, which cuts no figure in the governmental accounts, and the hospital fees paid by patients or insurance companies in their behalf, of which no notice has been taken above.[2]

The second characteristic feature of university financing to which attention must be called is the altering direction of expenditure. Between 1868 and 1908, the percentage of expenditure on salaries and residences fell from 46 per cent to 30.8 per cent of the total outlay; the percentage of expenditure on laboratories and institutes rose from 40.3 per cent to 61.7 per cent. Average student cost, fluctuating considerably in the meantime, had, nevertheless, mounted from 530 marks at the former date to 762 marks at the latter. The changing nature of university education is apparent without further elucidation.

In the following table these significant items, which in no case take account of student fees, are brought together for the Prussian universities:

[1] Statistics compiled from *Preussische Statistik*, 204 (Berlin, 1908); *Etat des Ministeriums der Geistlichen, Unterrichts- und Medizinal Angelegenheiten für* 1910; and Lexis: *Deutsche Universitäten*, vol. i (Berlin, 1893).

[2] See below, pp. 290-292.

					Percentage of Outlay				
Year	*Ordinary Expenses Marks*	*Extraordinary Marks*	*Total Marks*	*Student Cost Marks*	*Administration*	*Salaries*	*Labs. & Institutes*	*Building*	*Residence Allowance*
1868–1869	3,886,633	501,121	4,387,754	530	5.67	45.95	37.07	3.19	
1877–1878	7,162,555	1,774,128	8,936,683	823	3.70	41.94	40.46	2.45	6.12
1887–1888	9,180,603	2,566,175	11,746,778	669	3.46	36	47.18	3.61	5.38
1896–1897	11,417,345	1,492,016	12,909,361	824	4.49	30.49	51.96	3.73	5.12
1899–1900	12,591,267	4,356,726	16,947,993	793					
1902–1903	14,033,521	3,663,517	17,697,038	785	4.14	29.46	53.77	4.19	4.85
1905–1906	15,426,684	4,079,205	19,505,889	762	4.11	27.93	55.45	4.17	4.77

The several universities taken singly show marked differences, though all tend in one direction.[1] That the day of small beginnings is over, the calculations dealing with the proposed University of Frankfort show: the initial budget, it is figured, would fall just short of 3,000,000 marks. At Berlin, the ordinary expense in 1868 amounted to only 748,332 marks, the extraordinary to 256,800 marks; by 1905–1906, the former had increased to 3,672,701, the latter to 1,100,150; in the same period, Göttingen increased on the current side from 545,790 to 1,497,717; on the extraordinary, from 59,440 to 434,450. The dissimilarities in student cost are not readily explicable: in the nineties, each student cost the University of Berlin 489 marks, the University of Munich, 264; at the same date, Göttingen, Kiel, and Königsberg expended 1300 marks per student, Giessen almost as much, Strassburg a little less than 1100 marks. The others range between 500 and 900 marks.[2] Finally, the relative requirements of salaries and laboratories in a single institution over a longer period may be illustrated by Wagner's statistics bearing on the University of Berlin:[3]

Year	*Salaries*	*Per cent*	*Institutes*	*Per cent*
1811	116,550 M.	71.8	39,294 M.	24
1834	193,650 M.	64.6	78,434 M.	26.2
1880	321,000 M.	52.8	267,000 M.	40.1
1896-1897	865,000 M.	30.9	1,481,001 M.	52.9

More pertinent to our present inquiry, however, is the actual current governmental

[1] By the courteous permission of the Controller of H. B. M. Stationery Office and of the Royal Commission on University Education in London, I am enabled to republish from the Third Report of the Commission a series of tables showing the cost of medical education in the universities of Prussia and Bavaria, supplied by the governments of those countries at the request of Professor Friedrich von Muller, and handed in by him as part of his evidence given to the Royal Commission. These tables are printed in the Appendix, pages 329, etc. Discrepancies between the figures given in the text and those given in the tables in the Appendix are due to the fact that they represent different years and in a measure different items; but the differences are not material.

[2] Lexis, vol. i, p. 158. For figures at the present time see Appendix, page 329.

[3] Quoted by Paulsen: *German Universities* (Thilly's trans.), p. 219 (New York, 1906).

outlay for the medical faculty. The following table is illustrative of conditions in several departments at universities differing greatly as respects size and situation:[1]

	Total Outlay	*Prof.'s Salary*	*No. Assts. and Cost thereof*		*No. Servants and Wages*		*Lab. Expense*
			ANATOMY				
Berlin	65,456 M.	9,000 M.	5	9,900 M.	5	8,480 M.	38,076 M.
Leipzig	62,308 M.	10,525 M.	3	13,200 M.	6	10,890 M.	27,693 M.
Königsberg	24,869 M.	7,000 M.	3	6,300 M.	2	3,080 M.	9,989 M.
Greifswald	23,451 M.	6,600 M.	2	3,850 M.	1	1,520 M.	11,091 M.
Giessen	18,980 M.	5,700 M.	2	4,200 M.	1	1,500 M.	8,080 M.
			PHYSIOLOGY				
Berlin	91,576 M.	9,000 M.	5	8,400 M.	6	10,940 M.	63,116 M.
Leipzig	45,554 M.	10,125 M.	4	11,980 M.	4	9,320 M.	14,129 M.
Königsberg	16,700 M.	6,300 M.	2	3,000 M.	1	1,200 M.	5,840 M.
Greifswald	13,948 M.	6,300 M.	1	1,500 M.	1	1,110 M.	4,868 M.
Giessen	10,300 M.	4,500 M.	1	1,200 M.	1	1,400 M.	3,200 M.
			PATHOLOGY				
Berlin	37,580 M.	8,000 M.	7	11,100 M.	2	3,280 M.	15,200 M.
Leipzig	56,511 M.	9,688 M.	5	9,055 M.	8	13,770 M.	56,511 M.
Königsberg	17,910 M.	7,000 M.	2	3,000 M.	1	1,200 M.	6,960 M.
Greifswald	19,296 M.	6,000 M.	2	3,000 M.	1	1,100 M.	8,686 M.
Giessen	16,620 M.	7,200 M.	2	3,000 M.	1	1,320 M.	5,100 M.
			HYGIENE				
Berlin	58,240 M.	8,400 M.	3	5,150 M.	7	11,040 M.	33,850 M.
Leipzig	34,442 M.	8,080 M.	3	5,150 M.	5	10,606 M.	10,606 M.
Königsberg	18,740 M.	6,300 M.	2	3,000 M.	1	1,450 M.	7,990 M.
Greifswald	15,275 M.	5,700 M.	2	3,000 M.	1	1,520 M.	6,555 M.
Giessen	15,160 M.	5,300 M.	2	2,400 M.			7,460 M.
			PHARMACOLOGY				
Berlin	27,267 M.	8,000 M.	2	3,000 M.	2	2,265 M.	14,002 M.
Leipzig	23,046 M.	9,480 M.	2	3,150 M.	2	4,240 M.	6,176 M.
Königsberg	15,590 M.	7,000 M.	2	3,000 M.	1	1,450 M.	4,540 M.
Greifswald	12,570 M.	6,300 M.	1	1,500 M.	1	1,520 M.	3,250 M.
Giessen	12,140 M.	5,900 M.	1	1,200 M.			5,240 M.

Expenditure on the same account in several other universities may be illustrated in somewhat less detail as follows:[2]

[1] For most of the material embodied in the following tables I am indebted to Professor Franz Eulenburg, Leipzig. It is to be noted that the salaries do not include student fees paid directly to the instructors; professors, assistants, and helpers frequently receive living quarters, heat, and light besides salary or wages, as the case may be.

[2] From *Bericht des Sonder-Ausschusses*, pp. 18, 19 (Frankfort a. M., 1911).

	Göttingen		Marburg		Strassburg		Bonn		Würzburg[1]	
	Personal	Non-Personal	Personal	Non-Personal	Personal	Non-Personal	Personal	Non-Personal	Personal	Non-Personal
Anatomy	13,930	14,050	13,820	14,041	20,250	8,400	19,045	17,000	17,200	18,200
	27,980 M.		27,661 M.		28,650 M.		36,045 M.		35,400 M.	
Physiology	8,580	5,938	15,650	9,007	13,580	4,800[2]	12,750	9,020	5,419	9,192
					14,260	7,000				
	14,518 M.		24,657 M.		39,640 M.		21,770 M.		14,611 M.	
Pathology	7,439	6,766	10,130	6,823	16,650	6,700	10,600	7,365	13,100	17,030
	15,196 M.		16,953 M.		23,350 M.		17,965 M.		30,130 M.	
Hygiene	8,530	4,740	32,220	18,583	15,590	6,000	8,950	5,750	8,350	4,500
	13,270 M.		50,803 M.		21,590 M.		14,700 M.		12,850 M.	
Pharmacology	7,600	4,345	9,200	4,105	13,100	4,450	8,550	3,840	5,200	5,200
	11,975 M.		13,305 M.		17,550 M.		12,490 M.		10,400 M.	

The most elaborate of German scientific institutes is the newly erected anatomical building at Munich. This palatial structure cost some 2,000,000 marks. The annual budget, exclusive of two professorial salaries,[3] amounts to 118,000 marks, of which, approximately, 8000 marks go to general service, 28,000 to heat, light, etc., 1200 to library, and 4000 to materials, instruments, photography, printing, etc.

The seven medical faculties of Austria required in the year 1909, 5,108,544 kronen,[4] as against 5,629,479 kronen the following year. The budget for 1910 is distributed as follows:

Vienna	2,127,582 kronen	Prag (Czech university)	724,446 kronen
Graz	473,898 kronen	Lemberg	463,708 kronen
Innsbruck	424,102 kronen	Krakau	646,345 kronen
Prag (German univ.)	769,398 kronen		

Of the increase — almost 600,000 kronen — Vienna obtained over one-half, 328,000 kronen, mainly to meet the increased running expenses occasioned by the opening of the new women's clinic.[5]

On the clinical side, the actual or total cost of hospital maintenance is largely in excess of the sums charged to the clinics in the government or university budget; in other words, the university gets the use of clinical facilities far more varied and extensive than it pays for out of current funds. This is not explicable by the existence of hospital endowments; for with a few exceptions, Göttingen, Greifswald, Strassburg, and Vienna, the most important of them, German institutions derive comparatively little support from invested funds, — less than one-fourth of their annual expenditure. The running expenses of the Charité exceed 2,000,000 marks annually; the

[1] Omitting professorial salaries.

[2] Physiology and physiological chemistry.

[3] Professor of gross anatomy and professor of histology and embryology.

[4] A krone is about twenty cents.

[5] *Das Oesterreichische Sanitätswesen*, p. 9 (Wien, January 13, 1910).

charge upon the university, nevertheless, is not quite half that sum.[1] Additional clinical establishments cost 821,304 marks, the governmental subvention amounting to less than half,—388,547 marks. To put it differently, the state procures for the university clinical facilities worth approximately 3,000,000 marks a year for less than 1,500,000. Substantially the same proportion holds elsewhere: of a total clinical expenditure of 544,083 marks at Greifswald, the university provided 289,501 marks; an outlay of 435,991 marks at Göttingen involved the state only to the extent of 206,926 marks. Expenditures on the medical clinic at Tübingen approximate 200,000 marks annually, to which the university (that is, the state of Württemberg) needs to contribute only 90,000 marks. How the difference is supplied I shall presently explain.

The expenditures above cited include not only administration and care of patients, but the salaries of physicians and the promotion of research. Salaries will be touched on presently; a word here on the subject of research. The university encourages research; so, also, to some extent do the municipalities. When, as at Vienna, Leipzig, and Munich, non-university hospitals—whether municipal or endowed does not matter—affiliate with the university, both parties to the bargain make an appropriation for laboratory support. The two appropriations are pooled, to be devoted to such objects as the professor selects. True to their conviction that research must be untrammeled, the Germans exact no accounting for sums thus earmarked. The money is spent within and for the laboratories: beyond that, no inquiry is made. The ideals of the university are the sole guarantee. Experience has taught that research is not only costly, but venturesome: the mortality among ideas, inspirations, experimental efforts, is prodigiously high. Waste is therefore inevitable; but, granted the competency of the investigators, it is to be accepted willingly. A most effective safeguard is, nevertheless, involuntarily present: for the total sums available are usually so small that only by the most careful husbandry can they be made to suffice. At Tübingen, for example, the medical budget (200,000 marks) allows 83,000 marks for care of patients, 29,000 marks for salaries, not including that of the director, 5000 marks for laboratory expense, 2000 marks for books, 3000 marks for instruments, X-ray room, etc. Laundry, heat, and light are paid for out of a general fund.

University clinics, then, may be said to be self-supporting to the extent of approximately half their cost; non-university clinics are even less burdensome to province or municipality.[2] Credit for this achievement belongs to intelligent legislation. The public hospital in Germany stands wide open to all that need medical relief: no one is turned away. Yet they are not, strictly speaking, free, charitable institutions. For practically every patient some one pays,—pays, that is, on the average about one-

[1] There are 794,791 marks for general purposes, 196,695 marks for teaching. *Etat des Ministeriums der Geistlichen, Unterrichts- und Medizinal Angelegenheiten für* 1910, p. 323.

[2] The cost of mere care of patients at the Charité averaged 1.26 marks per day in 1907 as against 1.40 marks in the municipal establishments of Berlin; but, total cost being considered, the Charité spent 5.19 marks per patient, the municipal institutions, 4.52 marks. E. Putter: *Verwaltungsbericht*. Reprint from *Charité-Annalen*, vol. xxxiii, p. 23.

half of the sum spent in his keep. By a system of compulsory insurance against accident and illness, the German artisan, laborer, and domestic servant are required to participate in protecting themselves against incapacity: to any one of several authorized insurance funds or associations, the employer pays one-third, the insured individual two-thirds, while the government grants the services of the necessary officials. The public hospital looks to these funds for its fees; in case patients are not included in the list of those compulsorily insurable, — day laborers, for example, — the hospital sends its bill to the appropriate parish or municipality.[1] The liability of the fund runs for twenty-six weeks in case of illness, thirteen in case of accident, at the end of which periods the responsibility is, if necessary, shifted. Patients are divided into three classes, according to the sum paid for maintenance: in the medical wards at Giessen, the first class pays as a rule[2] from 8 to 10 marks per day, the second from 4 to 5 marks, the third, in which we are mainly interested, from $1\frac{3}{4}$ to $2\frac{1}{2}$ marks; children under ten pay $1\frac{1}{2}$. The town pays the state — or university — a lump sum, 10,000 marks annually, for medical aid furnished its non-insurable poor. At Marburg, close by, the charges are on the average a little lower, — from 6 to 8 marks, from $3\frac{1}{2}$ to 6, and $1\frac{1}{2}$ respectively. At Tübingen, the charges range from 4 to 8 marks for single rooms,[3] 1.80 marks and 1.20 marks for the second and third classes; the director can also accept free patients (homeless or belonging to non-insured classes), of whom he has usually 25 out of a total of about 200. In large towns, on the other hand, they are a little higher. At Strassburg, third-class patients from outside points with which the Burgerspital has a contract pay $3\frac{1}{2}$ marks, others $3\frac{4}{5}$ marks, per day; the local associations pay a rate of about $2\frac{1}{2}$ marks. At Berlin, the lowest rate is 3 marks per day.

Herewith the secret of the German clinic in the small university town is laid bare. Marburg and Giessen lie within reach of Frankfort. By making a slightly lower hospital rate, and a low transportation charge, they attract the patronage of the insurance associations of these great centres. The artisan and peasant make no objection: to them the university professor is one of the important personages,—a great dignitary, in whose hands they feel secure. Even so, the consciousness that they are not mere objects of charity stays with them. Occasionally, a patient declines to permit himself to be used for teaching, as, under the circumstances, he has a right to do. His wish is scrupulously respected.

Before leaving this topic, another word should be said in praise of the statesmanlike handling of the problem of clinical education by the German states and municipalities. For economic reasons, compulsory insurance was instituted; thus a situation was created in which immense clinics were sustained by means of relatively

[1] For an exhaustive account of Workingmen's Insurance in Europe, with bibliography, see *Twenty-fourth Annual Report of United States Department of Labor*, 1909 (Washington, 1911).

[2] Charges are a little higher in winter. The women's clinic is slightly less expensive. Where obstetrical cases are badly needed, the fee may be suspended, provided the women assist as long as they are able to do so in taking care of the clinic.

[3] Of which there are about 25.

small outlay on the part of the authorities. Now, the university faculties of medicine need clinical facilities. The long reach of a far-sighted government brings the two together. The hospitals, the universities, the public, — all profit. In other countries, too, hospitals and universities exist in the same towns: but Germany alone has shown the statesmanlike capacity to link them together in ways that most effectively promote the purposes for which they severally exist.

The university budget fails, as I have said, to convey a correct idea of the extent of the clinical facilities of the medical faculty or the cost to the nation of their upkeep. In still another respect does the budget present an inadequate picture of the situation. It reckons as teaching cost only such salaries as are paid. Student fees appear nowhere on the books, either as income or outgo; as a matter of fact, university teaching costs the sum of salaries and fees; for tuition fees supplement salaries, at times constitute them.

An ordinance, effective April 1, 1908, fixes the salary of the ordinary professor at Berlin on appointment at 4800 marks; at intervals of four years, this sum increases by 400 marks, so that, at the close of twenty-four years' service, it stands at 7200 marks; outside Berlin, the Prussian *ordinarius* begins with 4200 marks and rises ultimately to 6600 marks. Professors extraordinary and heads of divisions in laboratories and institutes start with 2600 marks and cannot rise beyond 4800 marks, which they attain after a score of years.[1] An additional allowance — "house money," so called — is also to be added in: 1200 marks a year at Berlin and Breslau; 880 at Bonn, Kiel, and Königsberg; 720 at Göttingen, Greifswald, and Marburg. Not every *ordinarius* or *extraordinarius*, however, receives a salary. At Berlin, 17 *ordinarii* in the medical faculty are salaried,[2] 7 unsalaried; at Göttingen, 11 and 2, respectively; 13 and 4 at Bonn. Among the *extraordinarii*, 32 are paid, 22 unpaid in Berlin; 8 paid, 6 unpaid at Halle; 9 all paid at Marburg.[3] Eulenburg found in July, 1907, the following salary distribution among the *extraordinarii* of the medical faculties in Germany and Austria:[4]

	Number of Extraordinarii				
	receiving no Salary	*receiving* 1000-2000 M.	*receiving* 2000-3000 M.	*receiving* 3000-4000 M.	*above* 4000 M.
Prussian Universities	29	23	21	12	1
Non-Prussian Universities	38	30	27	20	14
Austria	39	8	3	9	17

The remuneration of the assistant is even lower still. It is indeed amazing on what meagre support the German assistant will make ends meet. He receives a few hundred marks as salary, — sometimes not even that; in some instances board and lodging, besides; and earns varying sums by giving special courses, now to ordinary

[1] Professors who are also practitioners of medicine forego the periodic increase. Circular of the department, included in the *Etat*, referred to on page 291.

[2] "Etatmässig."

[3] *Etat*, pp. 286-289.

[4] Eulenburg: *Academische Nachwuchs*, p. 134.

students, now to groups of visiting physicians, now to single individuals, foreigners mostly, who desire help in special lines. The precariousness of his livelihood has developed a unique and unparalleled strain of idealism; but it has had other less lovely consequences. The hard lot of the German assistant excludes some from the academic career; others it compels to marry from worldly motives, or to engage in practice; at times, scientific competition takes on the character of jealous business rivalry. But the last word concerning the German assistants ought in fairness to be one of unstinted admiration: nowhere else in the world is there to be found so devoted a race of men whole-heartedly giving themselves to scientific progress with so little hope of earthly reward.

However, the salary does not constitute the sole, sometimes not even the main, compensation of the university professor. Examination fees form a substantial addition of indefinite size: in large centres, the income from this source is considerable. Formerly, student fees went the same way. Nowadays, the Prussian government turns over to salaried instructors without discount tuition fees up to 3000 marks; 75 per cent of the next thousand, and 50 per cent beyond that point. In Bavaria since 1909, salaried teachers receive student fees up to 6000 marks yearly; one-half of all additional. The portion retained by the state is supposed to be employed in helping out instructors whose courses enroll few students. Non-salaried teachers receive their fees in full.[1]

Obviously, the total cost of teaching in the German universities is greater than their budgets by the amount of fees not taken into account. Whether the German plan is on the whole a wise one is somewhat fiercely questioned. The great pecuniary prizes help to make university life an attractive career to forceful and able men. But there are strong countervailing disadvantages. It is not demonstrable that the greater financial inducement has procured for anatomy abler or more devoted scientists than go willingly into the meagre service of pharmacology[2] or hygiene. Enormous discrepancies of income do not really mean that a far more able set of men are to be found in one branch than in another. If, however, interest in science is really the selective factor, then, as universities now go, excessive rewards at one point involve regrettable denials elsewhere. This was of no consequence in the mediaeval university, where every lecturer went his own way: the field was open and fair, and each was perhaps entitled to his own. But the organic unity of the modern university creates a different situation: the whole suffers if an important limb is under-nourished. And as the cost of living has both relatively and absolutely advanced, under-nourishment involves increasingly severe — even deterrent — hardship. Of 213 docents in the medical faculty respecting whose income Eulenburg collected accurate statistics, one-half were also assistants in receipt of from 1200 to 2000 marks a year, — a poor recom-

[1] See *The Financial Status of the Professor in America and in Germany*, Bulletin No. 2, Carnegie Foundation for the Advancement of Teaching, New York, 1908.

[2] On the other hand, the pharmacologist may increase his income by patenting his therapeutic discoveries, which is not forbidden by the prevalent ethical code.

pense for the heavy routine which they undergo. Their lot is not greatly altered by the small additional income derived from special courses, or by such perquisites as board and lodging. The other half received fees alone.[1] Such outside practice as they can obtain is not, on the average, considerable. Centralized administration with better equalized remuneration will not repel men interested in the object: it will procure a more equitable distribution of rewards and a more even and healthy development. Agitation in this sense is active throughout the university world.

But an even more serious objection to the fee system arises from the creation of a proprietary interest in obsolete teaching methods. In Germany, as in Scotland, the personal prosperity of the clinical teacher is dependent on a pedagogically bad distribution of students. Mass teaching persists in the amphitheatres of Germany, and in the hospital wards of Edinburgh and Glasgow,[2] because it pays,—an advantage greatly increased in case the teacher is examiner also. Austria has abolished the fee system entirely; the fees are paid into the university chest, and the general level of salaries has been elevated. The *extraordinarius* starts at 3200 kronen, and reaches 4000 in a decade, plus the usual allowance.[3] The Prussian restrictions above noted were introduced by Althoff, as the initial step in a campaign for the sequestration of fees. "The fee business is absolutely unethical," he is reported to have said shortly before his death, "and I will yet get rid of it."[4] This, however, he failed to accomplish.

The hard conditions that have just been described have had as yet no noticeable effect on German enthusiasm. The scientific spirit is nowhere overborne by economic hardship. Salaries may be small; other income precarious; laboratory appropriations scant. But the lamp burns brightly. If assistants cannot be hired, volunteers come forward; they pay their own expenses and contribute to the general upkeep of the laboratory. Their fees purchase materials, books, animals, and, above all, hire a helper, the one indispensable factor in the German laboratory. Small sums achieve impossible things: a single salary, for example, is provided for the serum division of the pharmacological department in Berlin; yet there is an active staff of eight volunteers and two helpers. In a chemical laboratory there were forty advanced workers: the annual appropriation was only 4000 marks. Truly, a small sum in the hands of devoted scientists proves a veritable widow's cruse.

Meanwhile, one hears occasionally that idealism is waning. Perhaps so, at the top. A prosperous professorial surgeon or physician now and then disturbs the academic picture, but the rank and file are sound. With an enthusiasm hard to duplicate elsewhere in the world, they give themselves to science and teaching in a spirit of almost religious devotion. Undoubtedly they surrender too much; undoubtedly

1 Eulenburg: *Academische Nachwuchs*, pp. 110, 111 (Leipzig, 1908). An occasional docent in Berlin or Vienna prospers by giving special courses to foreigners.

2 A new ordinance of the University of Glasgow (July 7, 1910) gives the university the right to regulate the number of students attending a class for bedside instruction (sections 7 and 8).

3 Bermer: *Die Rechtsverhältnisse der deutschen Universitäts Professoren*, pp. 96, etc. (Giessen, 1903).

4 Quoted by E. Horn in *Ethische Kultur*, May 15, 1910, p. 73.

many are lost to science because, whatever their will, the sacrifice required is an impossible one. Science, too, suffers. Abderhalden points out[1] that successful research is no longer a matter of a happy accident or a lucky inspiration occurring to an individual: the day of such simple strategy has passed. A campaign must be planned and carried out by a group of men supporting one another. But in that case, the group must be relatively stable. Under present conditions, men cannot be retained long enough. Large resources are needed, though the individual will still be content with a modest competency. Once for all, the German scientist — be he laboratory man or clinician — realizes clearly that in choosing a university career he has forsworn mammon. The exceptions have lost caste: upon them the disapprobation of the university world falls heavily. It is generally recognized that their place is outside the university. "In the struggle of daily life for glittering possessions, the university, unconcerned, must be the quiet home in which knowledge blossoms and the spirit unfolds itself freely and purely."[2] These words are still, on the whole, a fair characterization of the tone of the German university.

The cost of a medical education to the student is heavy, varying less than one would be disposed to think as between large and small towns. About 300 marks usually are required for tuition fees, books, etc.;[3] living expenses, exclusive of clothing, are estimated at about 1200 marks for the two semesters; from 7500 to 8000 marks make the minimum for the entire course, and leave the student without allowance for examination fees or vacations. Bickel estimates that, all told, a student requires from 12,000 to 15,000 marks.[4] Twenty years have made no material change in this respect. Lexis, writing in the early nineties, reckoned the cost of a year to a medical student in Königsberg at 1515 marks, in Berlin at 2049 marks.[5]

The lot of the needy student may be variously relieved. The payment of fees is a private matter in the hands of the professor: he is free to waive his rights entirely, or to grant a respite, if he pleases. At certain universities, committees are appointed, who, evidence of pecuniary incapacity being shown, grant a delay of six years, at the close of which period the proper officials endeavor to collect the debt: further postponement is common. Scholarship funds also exist, the income of which is annually distributed. In the two semesters of 1905 and 1905–1906, out of a total attendance of 40,509 in Prussian universities, 5023 enjoyed fee exemption; 8435 (many of course

[1] In *Medizinische Klinik*, 1910, No. 5.

[2] Max Rubner: *Unsere Ziele für die Zukunft*, p. 9 (Leipzig, 1910).

[3] That this estimate is reasonable appears from the fact that the tuition fees in the recommended plan at Berlin run as follows, taking the ten semesters in succession: 127 marks, 282 marks, 163 marks, 238 marks, 115 marks, 167 marks, 267 marks, 232 marks, 302 marks, 303 marks. Much more formidable calculations are published by the professional associations, eager to deter young men from the career. One reaches 22,000 marks, including everything. See *Verband der Aerzte Deutschlands*, Veröffentlichung, No. 18, "Wer soll und wer darf Arzt werden?" Weinbaum, pp. 6-9 (Leipzig, 1910). More modest (15,000 marks, all told) is the estimate of Ostermann: *Wie studiert man Medicin?* pp. 7-10 (Leipzig, 1906).

[4] *Wie studiert man Medicin?* p. 13.

[5] *Deutsche Universitäten*, vol. i, p. 163.

already counted among those exempted from fees) received additional aid: among them 966,720 marks were distributed.[1]

The economic outlook of the young practitioner cannot be described as cheerful. Not only are eligible locations overstocked: the legitimate field of the physician is curtailed by widespread resort to quacks (to be discussed in the next chapter), and the employment of midwives,[2] of whom Prussia in 1907 supported 20,878,—1 to 1816 inhabitants. Moreover, the prevailing medical tariff is low, especially in the sphere of contract practice. The Prussian law permits patient and physician to make whatever bargain they choose; but in the absence of agreement, physicians on their first visit may charge from 2 to 20 marks, for subsequent visits from 1 to 10; for a first office consultation from 1 to 10 marks, for subsequent consultations of the same kind from 1 to 5. An elaborate schedule of surgical fees is also legally prescribed in default of specific contract to the contrary. The removal of a tonsil is valued at from 3 to 15 marks, a complicated tumor 20 to 200, amputation of a toe 10 to 30, setting a fracture 10 to 30, a natural confinement 4 to 10, with half as much more in case of twins.[3] The benefit funds have in some places taken advantage of competition due to overcrowding to obtain at times for their clients terms hardly better than nominal.[4] The number of separate funds or companies increased from 18,942 in 1885 to 21,376 in 1904; their membership from 5,398,478 to 11,418,000 in the same space of time. In 1908, the total number of insured persons had reached 13,189,599,[5]—about one-fifth of the population of the empire. The total income of the funds rose from 66,100,344 marks in 1885 to 216,294,954 in 1901 and 381,000,000 in 1908; payments for medical services from 9,060,945 in the former year to 35,636,010 in 1901, and to 65,000,000 in 1908. The arrangements between physicians and funds are made on the following lines: each fund makes contracts with a number of physicians, who serve for an annual sum, agreed on in advance, or for a specified sum per case. This rate remains unaffected by the number of visits or consultations required in each case. The insured member is compelled to seek the services of one of the contract physicians. The Leipzig[6] funds have so contracted with so large a number of local

[1] *Preussische Statistik*, 204, pp. 188-193.

[2] *Gesundheitswesen des Preussischen Staates*, pp. 452-462 (Berlin, 1909).

[3] *Gebührenordnung für approbierte Aerzte*, etc., March 13, 1906; printed separately or in Rabe, p. 255.

[4] The literature of the topic is voluminous and for the most part controversial in tone. My figures are derived largely from the *Statistisches Jahrbuch für das Deutsche Reich*, 1910; Th. Rumpf: *Soziale Medizin* (Leipzig, 1908); A. Rabe: *Aerztliche Wirthschaftkunde* (Leipzig, 1907). The former contains bibliography and abstract of laws.

Among pamphlets dealing with the agitation may be mentioned:

H. A. Müller: *Die freie Aerztewahl in Magdeburg in Lichte der Praxis* (Magdeburg, 1911).
Haeseler: *Der wirthschaftliche Ruin des Aerztestandes* (Frankfort a. M., 1902).
Geffcken: *Wesen u. Grundzüge der Arbeiterversicherung, Münch. Med. Woch.*, 48, 49, 1901.
Scholl: *Stellung der Aerzte zu der Reform u. dem Ausbau der Arbeiterversicherung*, reprint from *Münch. Med. Woch.*
Lechler: *Arzt u. Krankenkasse, Münch. Med. Woch.*, 21-23, 1902.

[5] *Statistisches Jahrbuch für das Deutsche Reich*, 1910.

[6] For a complete study see: *Die Entwickelung und Tätigkeit der Ortskrankenkassen für Leipzig und Umgegend.*

doctors that something approaching free choice — for which the profession is continuously agitating — prevails; but in some other places, the funds employ only a small number, and thus by competition procure very cheap service. If statements issuing from professional sources may be credited, an association at Lichtenberg, with 11,000 members, pays two physicians combined salaries of 4000 marks for their services; a Hamburg sick benefit fund pays at the rate of 2 marks per head per annum, 3 for man and wife, 5 for an entire family; another Hamburg association, of 15,500 members, is reported as paying its physicians 50 pfennigs ($\frac{1}{2}$ mark) yearly for each person. In Berlin, the rate paid to young graduates is alleged to fall at times to 17 pfennigs, sometimes even to 5 pfennigs. More favorable terms are admitted to prevail in Köln, Breslau, and Magdeburg. The protests of the profession, and fuller experience in the operation of the insurance scheme on the part of the government, have led to rapid improvements, which are not disputed even by the profession. Rumpf[1] states that the average remuneration per head increased from 2.32 marks in 1885 to 3.69 in 1901. Later statistics show that the average expenditure per case for medical services more than doubled between 1885 and 1908. Nevertheless, in general the ordinary physician earns an unsatisfactory livelihood. A small number of well-known consultants and specialists thrive; so, too, the practitioners whose patrons are the well-to-do. But the bulk of the profession are ill remunerated. At a conference held in 1892, it developed that of the then 1747 practitioners in Berlin, $\frac{10}{17}$ had annual incomes of less than 3000 marks; of the other $\frac{7}{17}$, only 250 were counted whose income was over 8000 marks, and 170 — about $\frac{1}{10}$ — who earned over 10,000.[2] Statistics compiled by the government of Saxony are reported to show that 34.8 per cent of its physicians have an average annual income, all told, of less than 4300 marks apiece. Of 23 physicians in one district, with incomes exceeding 10,000 marks, only 12 earned that sum in practice; the rest had additional sources of revenue.[3] It must, however, in fairness be stated that the general lot of the profession has never been financially enviable, and that its rapid overcrowding and the spread of quackery — not the insurance scheme alone — are responsible for deterioration.[4]

In Austria, conditions are declared to be practically identical. Benefit societies numbering from 1000 to 3000 members employ physicians on salaries ranging from 1500 kronen to 2500 kronen; the remuneration for office consultation is said to average 30 heller;[5] for a visit, 40 heller.[6] In 1905, it was calculated that of 1,600,000 inhabitants of Vienna, one-third were thus insured in benefit funds employing 310 physicians. As there were at that date 2800 physicians in Vienna, 2500 remained for a maximum clientele of about 1,000,000 persons, a ratio of 1 to 400, which figure includes not only the more prosperous, but those also who are too poor to insure.[7]

To these demoralizing conditions the profession has responded by the organiza-

[1] Rumpf, pp. 33, 34. [2] Bickel, p. 11. [3] Lechler, in *Münch. Med. Woch.*, 21-23, 1902.
[4] See below, pages 311-313. [5] Six cents. [6] Eight cents.
[7] Gustav Dintenfass, in *British Medical Journal*, June 3, 1905, p. 1205.

tion of a union,[1] which has already extorted better terms from the insurance associations and more favorable legislation from the government. Into the details of the acrid controversies which have raged, it is impossible for us to go. Suffice it to say that the professional union has resisted the further extension of compulsory insurance, has struggled with the benefit funds for more generous contract prices, and for free choice of physicians on the part of subscribers. These efforts look to the economic rehabilitation of an independent, competitive profession. However, there are not wanting those who believe the outcome may be radically different. I have urged that the physician is a social instrument, the medical profession an organ for effective social protection against injury, disease, and untimely death. If society as a whole requires that all its individual members should, for the general as well as their personal good, receive prompt, competent, and sufficient medical service, the charge for the maintenance of a staff capable of rendering the necessary aid may in part at least have to be borne by society as a whole. Those who are financially able to employ a physician will continue to do so; in procuring similar attention for others, society, the better to protect itself against loss, contagion, etc., will itself take a hand. The scattered peasants of Pomerania, Posen, and Galicia can be helped in no other way: is the underpaid laborer of the towns in an essentially different or essentially better situation? What both need in the way of medical care, the general welfare—their own, too—demands that they should have; neither can pay what the relief—if it be satisfactory relief—is worth or costs to render. It may turn out that the restoration of competition would benefit part of the profession without even then bringing full medical attention home to the hearth of the German workman and his children; in that event, a case may be made out for a next step in the organization of an efficient sanitary service.

It is unfortunately impossible to make an equally complete financial exhibit respecting medical education in the other countries with which this report has endeavored to deal. In Great Britain, for example, the government has no supervisory authority; it can procure statements only from such institutions as participate in an Exchequer grant. The hospital schools and non-participating endowed institutions conduct their affairs at will, accounting only to themselves. In general, medical education may be said for many years to have paid its own way. Endowments were negligible; fees were retained by the teachers, minus such sums as were required for buildings and unavoidable running expenses. For many years, items coming under the last-named head were kept down as much as possible, and teaching was impoverished and mechanized in consequence,—a fair characterization of the old-fashioned proprietary régime. Recently, the general government has come to the relief of the universities with increasing liberality; just now it is turning an interested eye upon their medical departments. It has even gone so far as to grant a subsidy to some of the London hospital schools,—an act of misjudged generosity if it tends to strengthen

[1] Verband der Aerzte Deutschlands zur Wahrung ihrer wirthschaftlichen Interessen, with headquarters at Leipzig. The association publishes a journal, *Das Aerztliche Vereinsblatt für Deutschland.*

an obsolescent form of medical education. Hospitals, as such, have relied practically altogether on private subscriptions and gifts.

As compared with the continental conditions which we have observed, university expenditure in Great Britain is modest, though now developing with considerable rapidity. The several colleges at Oxford and Cambridge are indeed old and rich; but the scientific institutes belonging to the universities as distinguished from the constituent colleges live on scanty fare. The total income of six universities and the two constituent colleges of London University, as shown by their return to the Board of Education in 1908–1909, was as follows:[1]

Institutions	*Total Income*	*Fees*	*Endowments*	*Gifts*	*Local Grants*	*Exchequer Grants*	*Misc.*
	£	£	£	£	£	£	£
University of Birmingham	54,362	17,176	8,462	1,344	£7,081	15,070	5,229
Bristol	14,946	6,636	411	1,419	770	4,918	792
Leeds	56,563	14,641	7,183	2,285	15,522	15,167	1,765
Liverpool	72,599	19,721	16,198	4,863	14,350	16,132	1,334
Manchester	80,124	25,141	24,938	2,900	5,250	19,034	2,861
Sheffield	41,010	6,722	3,770	1,522	16,112	11,505	1,379
University College	55,867	23,686	11,066	3,421	1,960	11,250	4,485
King's College	49,394	26,387	1,582	4,473	4,171	9,704	3,077

It is evident from the above table that endowing of universities by the rich and noble has had little more development in England than in Germany. The sense of public obligation appears, however, to be forming in the provincial towns. The successful man is loyal to the birthplace that he left in order to make his way in the metropolis or across the water in the colonies; handsome laboratories at Liverpool, Manchester, and Birmingham testify to the genuineness and increasing strength of this sentiment. But more significant far, in view of British tradition, is the relation between income derived from endowment and income contributed by governmental grant, municipal or national. The eight institutions in question received from productive endowment in 1908–1909, sums varying from 2.7 per cent at Bristol to 31.1 per cent at Manchester; they averaged 14.6 per cent. During the same year, their receipts in the form of municipal grants ran from 3.5 per cent at University College to 39.3 per cent at Sheffield; in the form of treasury grants from 19.6 per cent at King's College to 33 per cent at Bristol; the local grants averaged 15.4 per cent of total income, the Exchequer grants, 25.2 per cent. Both local and treasury grants already exceed in importance income from invested funds, the treasury grants very markedly. Moreover, these last-named subventions have advanced with highly significant liberality. In 1889, the total government grant in aid of university colleges in Great Britain was £15,000, in 1902, £27,000, in 1909–1910, £99,100; in eight years the subvention increased 367 per cent. These figures indicate nothing less than a right-about face in the national attitude towards higher education, in keeping with

[1] Board of Education: *Reports from Universities and University Colleges*, pp. xiv, xv (London, 1910). Fuller information will be contained in the forthcoming Report.

the same policy already remarked in connection with secondary education. It is to be noted, further, that while the government exacts a statement from the institutions assisted, it does not interfere with their internal management. The Scottish and English universities enjoy, therefore, practically untrammeled freedom in working out pedagogic problems.

The Scottish universities make the following showing in 1907–1908 as contrasted with 1894–1895, in reference to the significant items:[1]

Institutions	*Total Income*		*Fees*		*Endowments*		*Local Grant*		*Parliamentary Grant*		*No. of Students*	
	1894-5	1907-8	1894-5	1907-8	1894-5	1907-8	1894-5	1907-8	1894-5	1907-8	1894-5	1907-8
	£	£	£	£	£	£	£	£	£	£		
St. Andrew's	15,836	28,882	2,745	6,547	5,231	10,047		4,500	7,800	6,300	261	548
Glasgow	55,094	76,587	22,799	39,333	10,860	14,973	8,700	8,700	12,180	12,180	1,944	2,557
Aberdeen	31,367	42,705	10,605	16,185	6,100	8,387	6,000	6,000	8,400	8,400	789	932
Edinburgh	72,050	93,085	35,783	49,660	9,979	13,374	10,300	10,800	15,070	15,070	2,939	3,292

The ratio of income from endowment to total income has remained almost unchanged during the thirteen years in question; grants have decidedly decreased in relative importance. The parliamentary subvention to St. Andrew's represented, in 1894–1895, 49.3 per cent of its income, in 1907–1908, only 21.8 per cent; at Glasgow, the percentage has dropped from 22.1 to 15.9; at Aberdeen, from 26.7 to 19.7; at Edinburgh, from 20.9 to 16.2. Tuition fees, on the other hand, play a distinctly more important rôle: 17.3 per cent at Aberdeen in 1894–1895, 22.7 per cent in 1907–1908; 41.4 per cent, 51.4 per cent, at Glasgow; 33.8 per cent, 37.9 per cent, at Aberdeen; 49.7 per cent, 53.3 per cent, at Edinburgh. The outlay per student could obviously fluctuate but little under these circumstances within a single institution, though varying greatly among them:

Average Outlay per Student

	1894–1895			1907–1908		
St. Andrew's	£58	6 *s.*	4 *d.*	£51	2 *s.*	4 *d.*
Glasgow	28	0	1	29	19	0
Aberdeen	39	10	1	43	12	4
Edinburgh	25	0	7	27	13	10

The medical budgets of the universities — Scotch and provincial — concern mainly the laboratory branches. The universities incur little expense for clinical instruction beyond the payment of salaries to professors of medicine and surgery. In some of the Scotch universities the salaries are quite considerable. At Edinburgh, the chair of pathology carries a salary of £1400, that of materia medica, £1290; medicine and surgery, £900 each; midwifery, legal medical medicine, and clinical surgery, £800 apiece: certain of the incumbents receive as much as £200 each additional for other teach-

[1] *Report of Committee on Scottish Universities*, pp. 41, 42 (London, 1910).

ing services. Of a total outlay of £31,447 on the department, £4270 suffice for upkeep, laboratory, and class expenses, as against £23,263 for salaries. At Glasgow, the professors of medicine and surgery receive each £800 annually; second professorships recently established carry with them a salary of £500 apiece. A further expenditure of £500 is incurred for assistants to the four chairs. The laboratory expense in medicine is practically nil; in surgery, £300, including wages. Clearly, little systematic provision or appropriation is made by hospital or university for laboratories beyond what the routine conduct of the hospital itself requires. Small sums are donated now by a staff member interested in some line of work or instruction, now by the hospital, without attempting strictly to discriminate between hospital and school charges. In this respect, the clinical situation of the universities is not in essence different from that existing in the hospital schools, shortly to be described.

On the laboratory side the following tables show the expenditure of seven institutions:[1]

Institution	*Total Outlay*	*Prof. & Teaching Assts.*	*Dept. Maintenance (wages and laboratory expense)*
		ANATOMY	
	£	£	£
Birmingham	1,444	11,165	279
Liverpool	1,256	977	279
Manchester	1,406	1,211	275
Sheffield	710	558	134
University College (London)	1,216	1,057	159
King's College (London)	998	793	204
University College (Dundee)	757	600	157
Glasgow	2,945[2]	2,560	385
		PHYSIOLOGY	
	£	£	£
Birmingham	965	756	208
Liverpool	1,258	1,094	433
Manchester	1,428	1,077	350
Sheffield	828	543	219
University College (London)	2,121	1,745	376
King's College (London)	1,225	954	270
University College (Dundee)	670	500	170
Glasgow	2,576	2,100	476
		PATHOLOGY	
	£	£	£
Birmingham	2,107	1,494	613
Liverpool	1,705	1,265	440
Manchester	1,516	1,100	416
Sheffield[3]	1,217	750	383
Glasgow[4]	2,010	1,725	285

[1] From *Report of Board of Education* above quoted, passim. In case teaching and maintenance do not quite equal outlay, the balance represents exceptional expenditure.

[2] Not including official residence. Professor's salary, £1200.

[3] Including bacteriology.

[4] To this should be added an item of £750 for the second professor and assistant maintained by the university at the Royal Infirmary.

Properly speaking, the three university colleges have no pathological departments, but utilize the pathological departments of the hospital with which they are respectively affiliated. Their pathological instruction is therefore on much the same footing as their clinical teaching.

The most costly departments of anatomy and physiology are found at Edinburgh, where of course the number of students calls for enlarged outlay. The stipends of the teaching staff, with other items of expense, appear in the following table:

	Total £	*Professor's Salary* £	*Asst.* £	*Lab. Exp.* £	*Museum* £	*Spec. Grants* £
Anatomy	3278	1600	915	350	231	182
Physiology	3242	1400	800	700		342

Other laboratory branches are too occasional for classification. Bacteriology and parasitology,[1] forming an independent department, are found at Liverpool (outlay £992), Cambridge (outlay £1549), Manchester (outlay £1000), University College, London (outlay £846), and King's College (£840). Pharmacological laboratories are found at three institutions,—University College, London, where £679 are annually expended; King's College (expenditure £264); and Cambridge (expenditure £250).[2] Tropical medicine[3] is adequately represented as a department only at Liverpool on an outlay of £931 yearly, where, too, bio-chemistry forms an independent department, enjoying a budget of £973.

The outlay of the reporting universities for clinical teaching is little more than nominal, as the following schedule indicates; probably the whole of it goes into salaries:

Institution	*Medicine* £	*Surgery* £	*Oper. Surgery* £	*Midwif. & Gynecol.* £	*Psych.* £	*Ophth.* £
Birmingham	105	105	30	112	18	18
Liverpool	143	245		264[4]	26	25
Manchester	648	105	58	62	25	15

Bristol and Leeds do not attempt to tabulate or classify their expenditures for medical education: the former reports an aggregate outlay of £2330, of which £1878 represent salaries; the latter of £3368, of which £2562 represent salaries.

The figures just reviewed confirm our previous characterization of British conditions. The clinical teaching of the universities is not university clinical teaching: it cannot be until the universities supply the cash nexus. Nor is it of modern clinical type: for it requires no material but sick persons,—not laboratories, scientific assistants, animals, etc.

On the other hand, the laboratory development is at once uneven and predomi-

[1] These departments vary considerably in object, sometimes being public health establishments (Manchester, for example), sometimes pure teaching and research institutes (Cambridge, for example). The earnings of the public health departments are used to expand them.

[2] Plus special grants made by Royal Society, Grocers' Company, etc.

[3] For independent schools of tropical medicine see page 322.

[4] Of which £40 is for laboratory expense.

nately undergraduate. Anatomy and physiology are the only two branches organized on a university basis in all the reporting schools. Pathology is similarly represented in but four; it is little more than a dead-house department in most others.[1] The ratio between total expense and laboratory expense betokens the precarious state of research: in anatomy, 81 per cent of the total outlay goes into salaries, the remaining 19 per cent discharging the cost of material, wages, and other laboratory items; in physiology, as we should have expected, laboratory maintenance consumes a relatively larger share, 24 per cent as against 76 per cent for salaries. Sherrington at Liverpool spends 34 per cent of his budget on laboratory maintenance.

On the financial sheets of the London hospital schools a hopeless struggle against overwhelming odds is depicted. Income is falling at a time when unavoidable expenditure is as steadily rising: from which in education, as in business, only bankruptcy can result. It is, however, idle to suppose that all would be well if attendance were large and growing. Endowments, government grants, and student fees combined do not, even in the provincial and Scottish universities, sustain more than a few departments in acceptable shape. Some departments are wholly omitted, and hardly anywhere is allowance made for research; the clinical situation has as yet hardly been touched. A large student enrolment would not alone alter the situation of the London schools. They would still require large sums, of the bestowal of which there is little indication. Sir Donald Currie's generous donation of £100,000 to the University College Hospital School is unique: and of this sum three-fourths was put into a building, only one-fourth left as the nucleus of a permanent sum. Guy's has lately come into possession of £8000, the income from which is to be devoted to pathology. Occasional sums have been also obtained to wipe out accumulated deficits or to enable the smaller schools to continue awhile longer their hand-to-mouth existence. This is practically all. And for good reason: educational endowments may greatly increase in Great Britain without essentially benefitting the hospital schools. For the hospital school is a private affair, in which the staff is enormously more interested than the public. Such enterprises appeal hardly at all to benefactors seeking to advance the general good. For the same reason, little is to be hoped from the government, despite a hesitating step or two in the direction of aid to these essentially private ventures.

If, now, the London schools are to fight it out with fees, their prospect is indeed gloomy. The most prosperous of them are in receipt of total incomes of from £10,000 to £12,000 annually; those with dental annexes receive a third more, the surplus of the dental department being used in carrying the medical. Four or five schools of medium size obtain total incomes of from £4000 to £5000 yearly. The total receipts of the others are too small to speak of. The larger sums mentioned are required to meet all the expense connected with the instruction of some 300 students. Approximately one-half of the gross receipts is paid out in salaries; one-quarter goes for rent,

[1] From this statement separately supported work, such as is in progress at University College or Guy's, is, of course, excepted.

rates, taxes, interest; the remaining quarter pays wages, equipment, laboratory materials, prizes, etc. The salaries are mainly those of the instructors in the underlying sciences,—anatomy and physiology, especially,—ranging from £200 to £400. These entirely inadequate pittances have failed to hold in London the more competent teachers developed there. The current flows from London to the provinces and Scotland, not *vice versa:* London physiologists have migrated to Oxford, Cambridge, Liverpool, Edinburgh, Montreal, and Toronto; London anatomists to Birmingham; a London pathologist to Cambridge. The clinical teachers receive little or nothing; but the diversion of pay from them to the scientific teachers has not sufficed to meet the need, for the total available is simply inadequate. Nevertheless, this diversion has well-nigh robbed medical teaching in London of its direct profits: only a few schools still pay the clinicians a dividend,—a mere honorarium, even then. One school, that was within the memory of men still alive worth £1000 to each lecturer, now returns a paltry 50 guineas.

As the entire fund available for salaries is in any case too small, it occasions no surprise to find that such laboratories as exist live on very slight sustenance. The published statement of one school shows an expenditure of £2000 on salaries, as against departmental expenses of £28 in physiology, and of £55 in chemistry and physics together. The business aspect of medical education comes out unpleasantly when one notes that in this institution, whereas £455 were expended on museum, library, and all laboratories, £615 were bestowed in prizes, £202 were consumed in advertising, and £74 were donated to the students' club. A much larger school spends £9000 in salaries and wages, £2500 in general expenses, into which laboratory maintenance is reckoned. Still another, out of total receipts of about £5000, expends £400 on advertising, as against £175 on the laboratories of physiology, chemistry, physics, and biology: indeed, the allowance for rent of the students' club exceeds the cost of supporting four laboratories. An even more prosperous school spent £300 in excess of laboratory fees for materials, wages, and expenses in the laboratories as compared with £500 each for prizes and advertising.

In some institutions, part of the burden has been undertaken by the hospital on the ground that the school connection is valuable enough to pay for. As a rule, the title to the school property is in the hospital board. Money has been advanced from hospital funds to put up school buildings, on which sum the school pays an annual interest charge. In addition, the school uses the hospital dead-house and clinical laboratory without charge, both parties contributing to the salaries of pathologist and bacteriologist. Finally, certain hospitals have made their schools annual grants, occasionally of large sums: within the last five years, one of the smaller schools has received from its hospital annual sums running from about £300 to almost £1500. In 1905,[1] the Fry Committee reported that in the case of King's, University, the

[1] *Report of Committee appointed to inquire into Relation of Hospital and Medical Schools in London for King Edward Hospital Fund* (London, 1905).

Royal Free, and Guy's, the services of school and hospital fairly canceled each other; the other schools had been assisted out of hospital funds, the London Hospital School to the extent of £2500, Middlesex £701, St. Bartholomew's £1122, St. Mary's £652, St. Thomas's £788. If the recommendation of the Commission results in less informal relations, the tether of the hospital school will be still further shortened.

Meanwhile, the British hospitals have been liberally sustained. Their resources, whether gifts, subscriptions, or investments, all represent at bottom voluntary donations. In the year 1907, the twelve London hospitals used for medical teaching had a total ordinary income of £421,312; the twelve provincial hospitals similarly employed, a total income of £193,193; five Scotch school hospitals,[1] £116,085. Legacies of considerable size simultaneously swelled their permanent resources. In the following table the main items have been arranged:[2]

	Annual Subscript. £	*Donations* £	*Share King's Hospital Fund* £	*Invest-ment* £	*Total* £	*Legacies* £
12 London Medical School Hospitals	42,408	59,639	36,000	228,558	421,312	242,334
12 Provincial Medical School Hospitals	51,650	18,239		62,223	193,193	27,072
5 Scotch Medical School Infirmaries	32,508	8,471		33,087	116,085	55,583

With the exception of contributions to the schools as above noted in London, and perhaps of a similar nature elsewhere, these sums are entirely used in immediate ministrations to the sick.

London, then, may be viewed as the final and complete demonstration of the impossibility of teaching medicine out of fees. St. Thomas's calls attention to the fact that it has to teach the same number of medical students as Victoria University, Manchester: whereas at Manchester student fees form only 50 per cent of the cost of the department, St. Thomas's must make its fees cover all expenses.[3] Unquestionably, consolidation of several small departments would improve matters; and if, as has been urged, such concentration involved total surrender of all laboratory instruction to London University, the situation in the metropolis might thus become at least as good as that in the provinces and Scotland. But if, meanwhile, clinical instruction remains where it now is, England will still lack a complete and modern medical school.

The effort to keep insufficiently endowed schools above water has led to a steady increase of tuition fees, which have thus doubled in the last half century. About 1870, the total cost of an education at St. Bartholomew's was 95 guineas; in 1880, 132; at present, 180. The smaller metropolitan and the provincial schools are slightly cheaper, Liverpool costing about £150. The expense varies somewhat with the choice of the qualifying agencies: it costs perhaps £10 less to prepare for the Conjoint Board

[1] Infirmaries, so-called. [2] Burdett: *Hospitals and Charities*, 1909, p. 172.

[3] Pamphlet issued by school, p. 34.

diploma than for a university degree. Scotland has not yet adopted the composition or combined fee: at Edinburgh, the sum total of separate fees amounts to £162; at the Extra-Mural School, a candidate for the Triple Board qualification pays about £115 in fees; in Glasgow, matriculation, class, and examination fees for the entire course leading to the M.B. degree approximate £150. Adding in the expense of living, we may estimate the total cost involved at £350.

As against this heavy expenditure, the economic prospects of the practitioner are probably not much better than in Germany. The consultant may achieve a splendid financial success; but even then, only after a severe struggle. Sir Andrew Clark is reported as saying that for ten years he lived on bread, for ten on bread and butter, and finally for ten on bread and jam. The general practitioner is too commonly ill requited. Even those who remain unconvinced of overcrowding admit "that in certain places competition becomes too acute with an inevitable cheapening of medical service."[1] How the economic outlook of the practitioner will be affected by the recent insurance legislation remains to be seen. It will be interesting to observe whether, despite its strongly individualistic leanings, Great Britain may not lead in a more comprehensive organization of medical service. The suggestion has already been forcibly made.[2] Whether in any other way efficient medical aid can be brought within the range of all who need it remains to be proved. Highly significant, meanwhile, are the facts that, even on the low entrance standard prevalent in Great Britain, the physician does not go where he cannot be decently supported, and that he makes at least as high claims in the matter of support as the continental physician trained at the higher level. In respect to distribution, therefore, the chance to make a living is the decisive consideration. Where there is no such chance, society must intervene or medical aid will not be rendered. Assuredly, if society must act in any event, the service, in the interest of the purpose for which it is maintained, should be brought to a high educational standard.

[1] Sprigge, p. 51. [2] By B. Moore: *The Dawn of the Health Age.*

CHAPTER XIII

SECTS AND QUACKS

SECTARIAN medicine is all but unknown in Europe; and this, although the laws nowhere place the least obstacle in the way of its practice. The state neither favors nor discriminates against any particular school of medicine; a qualified physician may call himself what he chooses. It makes a single and uniform stipulation: every legally qualified physician must comply with the same educational conditions. He must meet the requirements in respect to preliminary general education; he must pass the usual professional examinations in the basic and medical sciences and in the clinical branches. That done, he may freely elect the object of his professional allegiance. Significantly enough, only a negligible fraction prefer a sectarian badge. The incentives to medical sectarianism appear to vanish if the sectary enjoys no special prerogative.

The homeopath is the only sectarian found at all in Great Britain or on the Continent. As he is not only prescriber, but also dispenser, of medicine, he is in Germany required, after qualifying, to pass an examination in dispensing. The commission having this examination in charge is composed of a botanist, a chemist, a pharmacologist, and a practising homeopathist, and sits permanently in Berlin. At present, out of a total of 30,558 physicians in the empire, 211 physicians designate themselves as homeopaths.[1] During the last twenty years, the annual average of those passing the special examination above named has been a little below 7; from 1904 to 1910, inclusive, the totals have been 3, 6, 3, 6, 6, 5, 4, respectively.[2] Obviously, homeopathy is a negligible and disappearing quantity in Germany.

The sect fares no better in England, where not even the additional precaution as to dispensing is taken. Any qualified physician may without further ado announce himself as homeopath.[3] According to the Homeopathic Directory of 1907,[4] 193 registered physicians in Great Britain and Ireland have chosen to do so, 55 of these being located in London: assuredly an insignificant fraction of a practising profession that in the same territory numbers 31,154.[5] Nowhere in Europe do special educational institutions of sectarian character exist. On the Continent, indeed, there are no educational provisions whatsoever. In London, two brief lecture courses — one on homeopathic materia medica, the other on homeopathic therapeutics — are annually given at the London Homeopathic Hospital, an establishment of 170 beds in Great Ormond Street. Outside the metropolis, the hospitals of the sect are pathetically meagre: the Hahnemann Hospital, Liverpool, described as a "general hospital for medical and

[1] Census, May 1, 1909.

[2] Figures courteously supplied by Geheimrat Obermedicinalrat Kirchner.

[3] This holds also of France, where homeopaths are very scarce. Exact figures are not obtainable.

[4] *International Homeopathic Medical Directory* (London, 1907).

[5] This figure is arrived at by subtracting from Churchill's total (40,642) 9488, who belong to the army, navy, and other services, or practise "abroad."

surgical cases, with special departments for Diseases of Women, Children, Eye, Ear, Nose, Throat, and Skin," possesses a total of 50 beds; a Birmingham institution, similarly pretentious, has 38; another in Kent has 18; one at Tunbridge Wells, 20; one at St. Leonard's-on-Sea, 18. "Smaller hospitals" are said to exist at Bristol, Eastbourne, and Leicester.[1]

The statutory theory on which European countries proceed in dealing with this subject is unassailable, and the practical outcome thereof inevitable. The sole difference between sectarian and regular or scientific medicine is in the region of therapeutic theory. Now, quite apart from the right and duty of the state to take in such a matter the standpoint approved by the weightiest authorities, it happens that therapeutics is only one item out of many, and educationally by no means of overshadowing importance at that. The main work of the medical school is its training in the fundamental sciences, in diagnosis, and in certain urgent practical procedures. The completer therapeutist is mainly built out subsequently. Without making light of such therapeutic differences as exist, one cannot for a moment contend that, as weighed against all the other constituent factors of the medical curriculum and the medical examination, these differences are bulky enough to warrant a separate ordinance or establishment. Medicine is primarily a question of fact. Treatment depends first on knowledge of normal conditions, then on the ability to discern and to interpret abnormalities. No matter what abstract principles as to cure one may entertain, the law occupies firm ground in insisting that all physicians must alike satisfy the single standard set up for the testing of proficiency in matters of essential fact. The sectarian makes no pretense that his anatomy, physiology, and pathology are peculiar, or that they involve any less or any different chemistry and physics. So far, at least, there is as little warrant for a special or sectarian medicine as for a special or sectarian engineering.

Sound policy suppresses sectarianism without cherishing the least hostility to it. Nothing else could be expected in an era whose pride is the increasing authority of science and scientific logic. This position does not imply a complacent view as to actual achievement. As a matter of fact, despite the positive increase of knowledge, in no age have men been more acutely and uncomfortably conscious of defect. But never before have they been so averse to relieving the discomfort of gaps by gratuitous intellectual or imaginative vaulting. The scientific mind confesses much ignorance, but no mystery. The preconceived notion with which the non-scientific mind spares itself arduous details of investigation and experimentation must prove itself or be dropped. For what is such a generalization except an alleged fact, to be proved or disproved, like any other? Between the practical requirements of the law, demanding compliance with established criteria, and the ceaseless beating of scientific intelligence, requiring that abstract assumptions submit to experimental accounting, the outlook for sectarian medicine in Europe is entirely and properly hopeless.

[1] *Homeopathy — Educational Facilities*, 1911 — a pamphlet issued by the London Homeopathic Hospital.

Meanwhile, everywhere the medical charlatan thrives. He has complied with the law, and is therefore a legally qualified practitioner. Occasionally he is doubtless the honest victim of his own unbalanced judgment. Having, as he supposes, successfully relieved what he had adjudged to be cases of Bright's disease, gallstone, appendicitis, pleurisy, and headache, by cold baths, electrical applications, or what not, in his incautious enthusiasm he insists that "but one thing is needful." But the misguided fanatic answering this description is less common and less formidable than the clever and insincere charlatan who is too lightly led by the prospect of gain to trade on credulity and despair. To deprive him of his opportunity to victimize the gullible portion of the public is indeed a difficult undertaking. The very candor of scientific medicine gives him his chance, for, just where the scientific physician admits his inadequacy, the charlatan is most positive. There lurks in many men a lingering fragment of the primeval faith in magic; others still retain, in part at least, the conception of disease as a just retribution for sin and error. Still others, impressed by the surprising powers found to reside in electricity, the ultra-violet rays, etc., invoke any expedient whose potency is not clearly demarcated or understood in the hope of encountering some unsuspected efficacy favorable to themselves. What wonder, then, if, when the physician admits or shows his helplessness, some fly to the magician, others resort to spurious mysticism, in the attempt to escape from the grip of physical or psychological law, and still others fall into the hands of unscrupulous practitioners, willing to deal with human beings on the theory that what is not demonstrably harmful may in obscure cases work some benefit?

The situation in respect to quackery[1] is entirely different. In Germany, owing to the ill-judged action of the medical profession, complete cure-freedom (*Kurierfreiheit*) now prevails. Up to 1869, special statutory provisions applied to practitioners of medicine. They paid a tax, were—at the peril of damage suits—required to attend urgent calls, and were likewise obliged to render certain unrequited services

[1] The literature on the subject is enormous, mostly controversial in tone. A fair idea is obtainable from the following:

Das Preussische Medizinal- und Gesundheitswesen, 1883–1908, pp. 403-465 (Berlin, 1908).
Das Gesundheitswesen des Preussischen Staates, 1907, pp. 451, 452; 463-467 (Berlin, 1909).
C. Reissig: *Medizinische Wissenschaft und Kurfuscherei* (Leipzig, 1900).
Max Rubner: *Ueber Volksgesundheitspflege* (Berlin, 1899).
Das Kurfuschertum und seine Bekämpfung (Strassburg i. E., 1904).

On the opposite side:

Die Kurierfreiheit, ein heiliges Gut des Deutschen Volkes (Berlin, Deutscher Verein der Naturheilkundigen, 1908).

Also: Publications of the Zentralverband für die Parität der Heilmethoden, etc. (Berlin, E. Ebering).

The progress of the agitation is fully described in the *Aerztliches Vereinsblatt*, published in Leipzig.
Truly prophetic is a little pamphlet entitled *Die aerztliche Praxisfreiheit und ihre Folgen*, by L. Rosenfeld, printed at Tauberbischofsheim in 1872.

I owe special acknowledgment to Dr. Gustav Siefart, Charlottenburg-Berlin, for much assistance in the study of his topic.

The General Medical Council of the United Kingdom published in November, 1908, a valuable *Digest of the Laws in the British Empire and Foreign Countries for the Prevention of Medical Practice by Other than Qualified Persons.*

to the poor. In return, the state suppressed illicit and unlicensed practice. The profession resented these obligations and attached no value to the compensating protection. A new statute, passed at their behest, abolished practically all the above-named stipulations. Medicine was placed on the same legal footing as the trades.[1] Nothing could be required of a doctor that was not required of a plumber; on the other hand, it was made practically as easy to prescribe drugs as to mend pipes. Special exactions fell to the ground; and with them, all special prerogative and protection. The university degree (M.D.), the governmentally conferred title (*praktischer Arzt*), and other official titles were indeed safeguarded. Unwarranted assumption of any one of them was made a punishable fraud; only a legally qualified physician was authorized to sign a certificate; finally, the unqualified physician was subject to fine or imprisonment if he showed a culpable measure of ignorance or unintelligence, or was stupid enough to be in charge at the moment of a fatal result. But earning a livelihood by unqualified practice was not in itself a penal offense. The precautions above specified have proved of little or no protective value. The difficulties in the way of proof are well-nigh insurmountable. Prosecutions are comparatively infrequent and rarely successful; the punishments inflicted are not common enough or severe enough to prove effectual deterrents. The profession, in fact, attached at the time little weight to this aspect of the affair. Warned as to the possible consequences of the proposed legislation, they replied that they trusted confidently to the intelligence of the German people.

Never was confidence more disastrously misplaced. Quackery in Germany has reached unparalleled dimensions. It has become a serious factor in reducing the possible income of the legitimate physician and surgeon; it cloaks immorality and vice. Both the public and the profession have suffered grievously. Medical practitioners struggling for economic rehabilitation, and social reformers eager to improve moral and hygienic conditions, are now united in an effort to place more intelligent legislation on the statute-books. They have, however, yet to overcome the bitter opposition of fanaticism, ignorance, and the strongly intrenched proprietary interest of a highly lucrative occupation. Unfortunately, too, sympathizers with quackery are often found in the ranks of the conservative aristocracy.

The evil takes many shapes. In its most specious form, it is hardly distinguishable from sectarianism. Quasi-scientific schools of healing, exploited by qualified men, are organized into associations, and have organized their victims along with them. Of these, the most flourishing are at this moment the nature-healers, who, denouncing all medication as poisoning, pretend to rely wholly on the normal constituents of the body: water and air make the regimen which will infallibly restore the diseased frame to health. Knowledge of anatomy and physiology is held to be superfluous. "Where in the world did the deer in the forest learn anatomy?—Yet he gets well

[1] Under the *Gewerbegesetz* of June 21, 1869. At first a Prussian law, this was made an imperial regulation on the establishment of the empire.

if out of sorts."[1] The association of nature-healers and nature-healed is said to number 200,000 members. Less highly organized and numerous, but still aggressive and prosperous, are the practitioners and devotees of occultism, Christian Science, Baunscheitism, electricity,—notably blue and green electricity,—all claiming a scientific basis. From these more pretentious forms, quackery tapers off to the sheer madness of the utterly untrained. Some cure all diseases by vegetarian diet, others by mixed diet; some with uncooked food, others with a combination of vermicelli and sour beans; one believes in water, the next in total dryness. The cruder advertise the most disgusting expedients: dirt and the very excrement of men and animals are vended as possessing magical curative properties. Though the quack is forbidden to procure practice by traveling from place to place, he may use the mails and advertise. The newspapers swarm with announcements of secret remedies. It is said that the annual turnover through proprietary remedies in Prussia alone exceeds 30,000,000 marks.

Efforts have latterly been made to ascertain the sources from which the army of quacks is recruited. Among them weavers, stocking-makers, shepherds, barbers, confectioners, and domestics abound. Most of them are quite uneducated. Rubner estimates that in Berlin perhaps a fourth of the quacks had progressed as far as *Obertertia* in the *Gymnasium;* of the female contingent, only one per cent have had a fair education.[2] A Prussian statistic[3] of 1900 finds among 1735 male quacks, 258 small farmers, 587 workmen, 300 tradesmen and artisans, 76 laborers, 35 priests, 99 teachers; among 669 female quacks, there were 49 midwives, 14 masseuses, 15 nurses, and 220 without regular calling.

In recent years, governments have interested themselves in ascertaining the extent to which quackery flourishes. Partial police returns exist as far back as 1879,—ten years after the inauguration of *Kurierfreiheit.* The growth in Berlin since that time is more or less correctly reflected in the following figures:

Date	*Registered Quacks*	*Date*	*Registered Quacks*
1879	28	1897	476
1889	231	1902	976
1894	355	1903	1013

The number of registered quacks increased 1600 per cent,[4] while the population of the imperial capital increased 60 per cent. In Prussia, compulsory registration began in 1902; but it was very imperfectly carried out, as is obvious from the fact that in 188 districts no quacks at all are reported; in 1903, 149 districts are still devoid of quacks, according to police returns. Nevertheless, the registration mounts as follows:[5]

[1] Quoted from Malten's "Medizin und Naturheilkunde," by C. Reissig, in *Medizinische Wissenschaft und Kurfuscherei*, p. 22 (Leipzig, 1900).

[2] *Ueber Volksgesundheitspflege*, p. 10. [3] Communicated by Dr. Siefart.

[4] The figures for the earlier period, before registration was made compulsory, are of course too low; but an enormous increase is indisputable.

[5] *Das Gesundheitswesen des Preussischen Staates*, p. 463 (Berlin, 1909).

Date	*Registered Quacks*	*Date*	*Registered Quacks*
1902	4104	1905	6137
1903	5148	1906	6260
1904	5529	1907	6873

In Saxony, they grew in number from 432 in 1878 to 2112 in 1905; in Württemberg, from 85 in 1880 to 329 in 1904.[1] But the rôle of unlicensed practitioners is not exhausted when we reckon those registered as such; for apothecaries, midwives, and others often engage in illicit and unacknowledged practice.

The conditions just described seriously aggravate the results attributed to overcrowding of the profession. Saxony, where there is already one doctor for every 2000 persons, registers half as many quacks as doctors; Prussia, at least one-third. A dozen years ago, it was estimated[2] that one-third of the entire practice of the country was in the hands of quacks, and since that date the mischief has spread.

Our interest in the topic is, however, educational, not professional. I have gone into details because the phenomena just described are not infrequently referred to as casting grave suspicion on the wisdom of the high standard maintained by the German government in the matter of medical education; just as if the extraordinary development of quackery were a compulsory adjustment,—a spontaneous outgrowth to occupy a gap left by the enforced depletion of the medical profession.

As a matter of fact, the two phenomena stand in no causal relation whatever. Quackery originated in thoughtless legislation designed to relieve the medical man of certain responsibilities and hardships; ignorance and unscrupulousness were quick to take advantage of the opening thus made. Education had nothing to do with it at the time, and has had nothing to do with it since. Doctors were much scarcer in 1869 than in 1899, and general health was inferior. Yet there were few quacks and no fear of them at the former date, while there were thousands at the latter. The profession had meanwhile increased in numbers far more rapidly than population. When the rise in quackery coincides with progressive overcrowding of the profession, how is it possible to explain it as due to depletion of the profession by a high educational standard? German quackery is the result of vicious and ill-considered laws. Precisely as abolition of laws against theft will create thieves, so abolition of laws against unqualified practice produced, and will anywhere produce, quacks.

These general considerations become even more convincing in the light of the fact that quacks and doctors are alike most abundant in large and prosperous communities. If the quack invaded chiefly locations abandoned as too unpromising by qualified practitioners, it might plausibly be argued that local need due to a too prolonged or expensive education gives him his opening. But such is not the case. The neighborhood that cannot support a physician possesses no attractions for the quack. His fees are amazingly large,[3] and his methods the more expensive because long drawn

[1] For these figures I am indebted to Dr. Siefart. [2] Rubner, p. 7.

[3] See Reissig, pp. 71, 104-107.

out. He prefers, therefore, to fish in the rushing waters of big towns. Berlin, with 3584 physicians, registers 1349 quacks. Other towns show the following:[1]

Dusseldorf	244	Köln	227	Hildesheim	108
Breslau	229	Cassel	116	Stralsund	51

Taking entire districts, the following table shows their relative status:[2]

District	*Physicians*	*Quacks*
Königsberg	420	33
Frankfort	395	376
Potsdam	1189	333
Schleswig	805	409
Hanover	435	98
Wiesbaden	1020	142
Sigmaringen	27	1

Obviously, quacks are very unevenly distributed, the ratios varying enormously: in the province of Saxony, for example, 51 for 100 doctors; in Hessen, 18 for every 100. In the district of Frankfort, 90 quacks to 100 doctors; in that of Sigmaringen, 3. But so much at least is certain: quacks and doctors tend to be plentiful together. In some instances, doctors are more and quacks less plentiful; in a few others, quacks are more and doctors less plentiful. But nowhere are quacks common where doctors are scanty. The sole exception would appear to be occasionally some remote district incapable of supporting either a qualified physician or a fairly intelligent quack. There the deluded peasantry may be imposed on by a farm hand or a shepherd pretending to heal wounds, mend limbs, and exorcise disease by crude charms or equally crude medication. One sees in the clinics of the adjacent towns the havoc that results. But here again the law, not education, is to blame. Competent physicians cannot there earn a livelihood. Under these circumstances, decent laws should prevent imposition that is far more disastrous than temporary neglect; for in the absence of the quack, the unfortunate peasant, after simply enduring for a while, would betake himself to a qualified practitioner in a neighboring town.[3]

But still stronger proof that quackery and education are unrelated phenomena is forthcoming. If Germany's high educational standard produces quackery, England's low educational standard should prevent it. The two countries are fortunately comparable because they disagree only in respect to the single factor whose alleged part in the causation of quackery we are concerned to investigate. Their statutes on the subject are substantially the same; but the countries differ widely in regard to the educational prerequisite to medical study. Quackery flourishes in both. Is the common phenomenon to be causally attributed to the factor as to which they differ, viz.,

[1] *Gesundheitswesen*, p. 463. [2] *Ibid.*, p. 465.

[3] The Austrian law is far superior to that of the German Empire. It makes unqualified practice for the sake of earning a livelihood a punishable offense; but as the police must initiate measures, prosecution lags. Moreover, proof is not easy, for habitual offense is not readily demonstrated. Patient and quack insist that gifts were made rather than fees paid, in which event no crime has been committed.

the general educational requirement, or to the factor as to which they agree, viz., the law? The common factor—and, luckily for this inquiry, the only prominent common factor—is obviously the causal agent. The factors as to which the two countries disagree—educational standard, for instance—may be cast out as without responsibility. The high standard of Germany does not itself produce quackery; neither does the low standard of Great Britain prevent it: in both countries the law that permits it causes it.

The English situation is thus not essentially dissimilar from that which we have just surveyed in Germany. The Medical Act of 1858 established the General Medical Council, charged with the duty of keeping a list of qualified physicians. It became the business of the Council to maintain the Medical Register for the information of "persons requiring medical aid," in order that they might "distinguish qualified from unqualified practitioners." The existence of such a directory was supposed to be enough: of course it would be used. As a matter of fact, the Medical Register makes a volume of something more than 1700 pages, not found in every household. The Englishman does not consult its pages before intrusting his health to a clever charlatan, any more than the German dupe protects himself by requiring proof of university training. In both countries negative protection has completely failed.

And negative protection is practically all that either country provides. The English law runs along much the same lines as the German: the state recognizes only the qualified practitioner; he alone can sign a death certificate, give medical evidence in a suit at law, or sue for fees. But any person at all may give or sell medical advice; one is simply forbidden, under pain of a fine "not exceeding twenty pounds," to pretend to be registered or to pretend to possess a registerable title. As long as a quack avoids assumption of one of the definitely established titles, he may with impunity use any other specious or misleading description that ingenuity can devise. A remarkable inconsistency may be pointed out in passing: the British anti-vivisection laws stipulate that license to experiment upon lower animals can be procured only by properly qualified scientists and under severe restrictions; but medical and surgical interference may be practised upon human beings without evidence as to training, competency, or skill, provided only the practitioner do not assume an unearned title.

Lack of a registerable qualification is in Great Britain, as in Germany, much more than offset by unbridled license in advertising. The hypochondriacal, the hysterical, the superstitious, the hopelessly ill, and the merely ignorant and foolish make a numerous, varied, and uncritical constituency, to which the newspapers, the billboards, and the 'bus give the charlatan easy and continuous access. There is profound truth in Lewis Carroll's line, "What I tell you three times is true." Midwives, opticians, nurses, prescribing chemists, and manufacturers swell the army of iterating impostors. In the absence of the police registration, lately introduced into Germany, it is impossible to make numerical statements as to the British quacks. But a few straws will show how the wind blows. In 1894–1895, 31,592 licenses, at five shillings apiece, were issued for the sale or manufacture of proprietary remedies; a decade later (1904–1905), this number had increased to 40,734,—a gain of almost 30 per cent. A stamp duty—for revenue, not for suppression of the traffic—yielded in 1860, £43,366; in 1880, £135,366; in 1900, £288,827; in 1906, £324,112.[1] A recent blue-book issued by the Privy Council Office, tabulating opinions gathered from more than 1600 Medical Officers of Health in the United Kingdom, leaves no doubt whatever that unlicensed practice is vicious, widespread, and utterly unscrupulous.[2] It takes everywhere the same forms: the titles in most frequent use are herbalist, bone-setter, faith-healer, nature-healer; abortion, venereal disease, consumption, hernia, and cancer furnish the most common and profitable field for exploitation. "Heavy fees are usually charged," remarks the government report.[3]

France has a better law than either Germany or Great Britain, but it is not enforced. Practice is limited to those holding the university degree and the few surviving holders of the diploma of "officier de santé." Any other individual habitually or continuously undertaking to treat disease is liable in the first instance to fine, and for repetition of the offense to imprisonment. Usurpation of the doctor's title constitutes a still more serious breach. The law is thus sufficiently explicit and rigorous; but magistrates enforce it so leniently that it is in many places a dead letter.[4]

It is idle to pursue the subject further. The roots of quackery penetrate deep. Its complete extirpation need not at this moment concern us; in the first place, because some of it is intra-professional and thus escapes prosecution; in the second, because some of it burrows underground and thus escapes detection. But the bulk of it is certainly preventable. Effective legislation, making successful prosecution feasible, has been proposed by the associated physicians of both Germany and Great Britain. No interference with sound educational conditions is needed in order to render this legislation safely enforceable. On the contrary, with quackery suppressed, the profession will offer better sustenance to the well-trained practitioner. Quackery is nowhere due to lack of doctors. Doctors are indeed not lacking in either country,—especially not in the places that quackery finds most profitable. But by reducing the clientele of the honest practitioner, charlatanism and quackery, if unchecked, tend to impair the efficiency of the qualified profession.

[1] W. E. Dixon: "Proprietary, Patent and Secret Medicines," *Proceedings of the Royal Society of Medicine*, London, 1910, iii (Therapeutic and Pharmaceutical Section), p. 88.

[2] *Report as to Practice of Medicine and Surgery by Unqualified Persons in the United Kingdom* (London, 1910).

[3] *Ibid.*, p. 20.

[4] The subject is fully discussed by Brouardel: *L'Exercise de la Médecine et le charlatanisme* (Paris, 1899). The volume also contains all the statutes bearing on practice, license, etc.

CHAPTER XIV

POSTGRADUATE EDUCATION

As distinguished from research, which is intensive and original in character, postgraduate instruction is practical in object and outlook. It wants to be helpful to practitioners of several types: to the busy urban physician and surgeon, in constant danger of losing touch with progressive developments; to those who lack the broadening and stimulating connection with a public clinic by reason of a hospital system that, despite its heavily predominating advantages, nevertheless has the defects of its virtues; finally, to those who, dwelling remote from centres of activity, are in danger of stagnation. How much postgraduate instruction can accomplish for any one person is largely dependent upon the quality of his original medical training. For postgraduate courses are, as we shall see, brief, and recur for most individuals only at somewhat lengthy intervals. Whether a practising physician, torn from his routine occupations, will profit by a two weeks' course in new methods of physical diagnosis, serology, or vaccine therapy, his previous training and intelligence decide. For the ill-trained man such instruction is hardly more than an exhibition of technical tricks, which he lacks apperceptive basis to comprehend or skill to apply. What he carries away will be superficial, mechanical, and perhaps perilous. On the other hand, men whose training has been scientific in spirit may gain much by an occasional dip into deep waters. The general quality of German medical instruction and the strong national predilection to scientific ideas gives postgraduate instruction of the right types an exceptionally favorable opportunity in Germany.

Occasional instruction of postgraduate character has long been in vogue. Practitioners have always visited and been welcome in the wards of the Paris hospitals, and in the great amphitheatres of Berlin, Munich, Leipzig, and Vienna. In the German universities, the *extraordinarii*, laboratory heads, and docents have also long been in the way of giving courses to foreign students applying for instruction on special points. But several circumstances have now combined to recommend more effective systematization,— among them, the ease and frequency of traveling, and the increase of pedagogic opportunity by reason of the rapid development of diagnostic and therapeutic art.

Various forms of organization are obviously feasible: postgraduate instruction may be made one of the functions of every local medical society,—utilizing native talent and local material, and on occasion importing the more prominent men within reach; it may take the shape of extension or vacation courses for physicians in the laboratories and clinics of the universities; finally, selected hospitals may be made centres of more or less regular instruction.

These various devices are all employed in Germany. A far-reaching but as yet imperfectly developed project for postgraduate instruction has been worked out by a voluntary organization, known as the Central Committee for Postgraduate Medical Education, established in 1900. The Prussian government lends its indorsement to the enterprise, and has assisted in a limited way with funds. Chiefly with private subscriptions, an attractive home has been erected,—the Kaiserin Friedrich Haus—provided with lecture halls, exhibit rooms, and loan collections, available for use in any part of the empire. The Central Committee holds that professional enlightenment, as a rule, must be effected without interference with the practitioner's routine, because most men cannot frequently drop their work in order to repair to Berlin or Düsseldorf for concentrated courses occupying several weeks. For those compelled to remain at home, the Committee initiates local courses, free of charge, conducted partly by local men, partly by lecturers from adjoining towns, both university and non-university. The courses take different shapes, being now weekly addresses on non-related topics given by successive lecturers, and again, weekly clinics held by different individuals; sometimes a series confines itself to one field; at times, practical courses are instituted requiring two or three hours weekly, and lasting from two to three months. At present, gratuitous courses thus arranged by the Central Committee are held in forty-eight of the larger cities of the German Empire. The lectures cover a wide range of topics and enjoy a fair degree of popularity. A clinical course given at Aachen in four different hospitals had an average attendance of 28; a winter course, laboratory and clinical combined, of seven exercises at Altona was attended by 63 physicians; in the summer of 1908, nineteen lectures at Berlin were attended by a total of 563.[1] In some places—Berlin, for instance—both university and non-university lecturers participate; in others—Bonn, Greifswald, Halle, Göttingen—the instructors are well-nigh wholly university teachers.

Side by side with the body just described, a distinctively university organization has grown up in the Association of Docents at Berlin.[2] Vacation courses, four weeks in length, are offered at the university twice yearly. They touch all topics likely to interest the practitioner, and are systematically arranged: the spring course in 1910 offered fourteen exercises in pathology, which took up the better part of every day for the appointed period, including autopsy work, regional pathology, surgical diagnostic, etc.; six exercises in physiology and pharmacology touched on clinical physiology, nutrition, calorimetry; thirteen in bacteriology included serum diagnosis of syphilis, immunity, etc.; internal medicine was presented generally, and in such subdivisions as the diseases of the heart and lungs, of the digestive and urinary tracts, and clinical laboratory exercises. Pediatrics, surgery, obstetrics, and other branches were similarly treated. These courses, for which fees are charged, differ from those

[1] *Reichsausschuss für das ärztliche Fortbildungswesen*, *Jahresbericht* 1908–1909, Naumburg a. S. Further details can be obtained from the publications of the organization, distributed from the Kaiserin Friedrich Haus, Luisenplatz, Berlin. A succinct account is given by Professor R. Kutner, Director of the Haus, in *Medizinische Anstalten auf dem Gebiete der Volksgesundheitspflege in Preussen*, pp. 132-159 (Jena, 1907).

[2] For details, see J. Pagel: *Aerztefuhrer durch Berlin* (published by H. Caspari), or *Das Medizinische Berlin* (published by S. Karger).

previously described in being concentrated so as to engage a large share of the time of the participants, and in expecting the attendance of non-residents.[1]

The academies of practical medicine at Köln and Düsseldorf were intended to embody a somewhat different conception. Fault having been freely found by the practising profession with the too theoretical instruction offered by the university, Althoff undertook to supplement university education by utilizing for instruction the clinical opportunities of great non-university towns, and perhaps also to diminish the overwhelming predominance of the medical faculties through the creation of non-university academies. The scheme appears not to have been completely thought out; and its author's resignation and death left it in a somewhat uncertain position. As the matter now stands, the government has made an arrangement with the municipalities of Köln and Düsseldorf, whereby the city hospitals of both are accredited teaching institutions of postgraduate character, the staffs receiving the honorary title of professor. Extension courses are conducted for the benefit of local physicians through the winter: some of these are practical and special, running from one to two weeks; others are weekly lectures on miscellaneous topics, attended by perhaps seventy-five physicians dwelling in the city and its vicinity. Practically, the academies are now covering in two cities the field undertaken by the Central Committee, except that the teachers are identified with but one hospital in each, possess nominal professorial titles, and present the appearance of an organized teaching body.

Thus far, however, the academies[2] have hardly justified their separate establishment. The local profession begrudges the hospital staff the additional importance it thus acquires; the university is distrustful of a possible competitor. Meanwhile, the municipal hospitals of these prosperous towns are, in construction, equipment, and organization, essentially university clinics. Their pathological departments are admirably organized and manned; the laboratories attached to the clinics are excellently equipped for both teaching and research. Those attached to the institution enjoy thus splendid opportunities; I have already pointed out that university chairs are not infrequently filled with men whose reputation has been made in these city institutions. The utilization of their facilities for the training of internes and the upbuilding of the local profession is all the more necessary just because their effective organization results in shutting out the bulk of the local profession. Even though no other academies be organized, the great municipal hospital can be made to count in the life of the entire medical body, on the lines favored by the Central Committee above mentioned.

In addition to these formal, though still imperfectly developed, opportunities of postgraduate character, the informal and unorganized opportunities already mentioned have not disappeared; they still constitute, perhaps, the most important part of the continuation work. Hospitals and laboratories generally are all potential workshops; a competent individual desiring opportunity can always obtain it. At every univer-

[1] A descriptive pamphlet is issued twice yearly by the Dozenten-Vereinigung at Berlin.

[2] See in *Med. Anstalten*, etc., article by Brugger, pp. 159-183.

sity, younger instructors, assistants, etc., eagerly embrace the chance to give such special instruction as may be called for. Supply speedily responds to demand. Short courses of almost every description can be arranged by consultation; those in common demand are regularly announced. Especially at Berlin and Vienna, to some extent at Leipzig and Munich, there is great activity in this direction. It is the main support of many docents and assistants, and constitutes the "foreign study" of most of the foreigners who for brief periods frequent the continental universities. The classes are usually limited to ten; at Vienna, they run five weeks, and are held at one or another of twenty-six different institutions.[1] Some instructors enjoy international repute for their skill in hitting off the needs and preferences of the foreign sojourner; native students are rarely found in their classes. The actual value of the instruction is very uneven. I attended a popular clinical course of this sort in Vienna. The instructor shows and discusses one case a day; his auditors are seated about the bed, only rarely verifying his pronouncement as to the condition of heart, lungs, tongue, or pupil; none participate actively. In Berlin, I observed similar classes in pathology and serology: all the students were foreigners, and the instruction elementary enough to amuse the docent who, with great skill, vigor, and intelligence, was doing precisely what his little band of transients had paid for. Serious study in the great clinics and laboratories of the Continent makes indeed a memorable experience in a physician's life history. But students who are ignorant of the language, or whose original training has been inferior, get no contact with what is characteristic or valuable in continental medicine.

An independent organization, the Vienna Policlinic, merits a word at this point. Certain peculiarities of the university system, already pointed out, are responsible for its existence. The university creates *extraordinarii* and docents, without giving them, as such, material with which to teach. In history, economics, or mathematics, this matters little; it is a simple thing to procure an unused room. But in science, an additional appointment as assistant, with further permission of the chief, is requisite; and if the assistantship lapses, the teaching opportunity always falls with it. In Berlin and Leipzig, the ex-assistant clinician sets up a private policlinic, where he gives courses in virtue of his docentship. The university announces these courses in its catalogue, though it has provided no material and assumes no responsibility for them. At Vienna, former assistants have combined their forces to establish a large policlinic, to which a hospital has now been added.[2] It is governed by a committee, who fill vacancies as they arise from the ranks of university docents not at the moment enjoying teaching facilities in the universities. The courses offered may be taken by university students; but they are mainly of continuation character, and are followed by physicians visiting Vienna for brief periods.

[1] *Ärztliche Fortbildungskurse der Universität Wien* (Berlin and Wien, 1911). A Bureau of Information (*Auskunftsstelle*) is located in the Allgemeines Krankenhaus, I Hof.

[2] See *Jahresbericht der Allgemeinen Poliklinik* (Wien, 1910). Also, *Statuten* of the same (Wien, 1905).

The Vienna Policlinic is of university complexion and hence does not occupy the field cultivated by the Central Committee of Berlin. The local medical fraternity outside the university has therefore begun to arrange continuation courses at university and non-university institutions, for the especial benefit of the Viennese practitioner. Latterly, on the occasion of a cholera scare, a special cycle was at once arranged to take place at the Institute of Experimental Pathology. The profession attended in large numbers; the topics presented included differential diagnosis of cholera, prophylaxis and therapy, municipal precautions, etc. Similar undertakings are to be found at Graz, Prag, and other centres.

The upshot of these somewhat various arrangements may be fairly summarized as follows: the need of postgraduate education to fill in the gaps left by a defective medical education will disappear as medical education itself becomes increasingly sound. Meanwhile, well-trained men require renovation from time to time. Some of these may have to obtain the requisite opportunities at or near their home, and provision may well be made for them in connection with local hospitals; others, more fortunate, can at intervals repair to great centres of medical education, where more or less informal opportunities to witness recent work and methods will be highly stimulating. Well-educated men can profit on either plan. The formation of special postgraduate schools appears to be quite unnecessary: they would probably be inferior in equipment and range to the university departments. If practitioners can and must leave home to procure opportunities, they will probably do better if free to select from the varied abundance of the metropolitan hospitals than if restricted to a single specifically postgraduate establishment.

Little special provision for postgraduate study is made in Great Britain or France, though visitors are readily welcomed in both places. In Paris especially, the rounds of well-known physicians are daily followed throughout the year by throngs that sometimes seriously overcrowd the wards. But the instruction offered is not primarily or systematically designed for visiting practitioners. In Edinburgh and Glasgow, vacation courses for graduates are held at the Royal Infirmaries,—the University and the Extra-Mural lecturers coöperating. The subjects dealt with are general medicine and surgery, the class in the latter being restricted to twenty-five. In London, a Postgraduate Association has been formed,[1] which sells a composition ticket, admitting to all clinics, clinical lectures, operations, and autopsies of the constituent hospitals, eight general and six special in character, but the exercises in the general hospitals are simply the routine exercises of the medical school. At the National Hospital for the Paralyzed and Epileptic, in Queen's Square, a special course of eighteen lectures is given in the month of November. Brief courses, running from three to six weeks, are also offered at the Medical Graduates' College and Polyclinic in Chenies Street, and at a few hospitals, St. Bartholomew's among others. But the profession at large has thus far shown much less interest and activity than are in evidence in Germany and

[1] The address is 20, Hanover Square, W.

Austria. Much the most active hives of postgraduate training are the Schools of Tropical Medicine at Liverpool and London. At the latter, three months' courses are given, running daily from ten o'clock to one and from two o'clock to five. A class ranging from forty to fifty is trained for the special needs of missionary or service activity in the tropics; advanced courses, lasting three weeks, may follow the regular class work. In consequence of the proximity of a hospital for tropical diseases, the training is of both laboratory and clinical character. Should medical education in London be at any time reorganized on a university plane, many of the hospitals now used for undergraduate medical instruction will forfeit that function. The strong teaching tradition that fortunately pervades them can perhaps be diverted into the postgraduate channel. A qualified practitioner returning to London for observation and study would then find there, as he already finds in Berlin and Vienna, a wide field of experience open to him: regular university courses, courses specially arranged for, and the chance of following the hospital work of every distinguished physician or surgeon. The broader and more informal these opportunities are made, the better they are, provided medical education is itself fundamentally sound.

CHAPTER XV

MEDICAL EDUCATION OF WOMEN

ACCESS to the medical faculty on the terms enjoyed by men was granted to women by the Swiss universities in 1876. The constituent states of the German Empire have reluctantly, one by one, adopted the same policy. Bavaria, Alsace-Lorraine, and Württemberg had removed all restrictions, while Prussia still allowed women to attend lectures only as hearers, dependent, from one semester to the next, on the express written permission of the rector of the university supplemented by that of the instructors concerned. There, as elsewhere, the doors have now been opened.[1] The women's movement, as it is called, has indeed attained formidable proportions in the German nation, despite deeply rooted domestic traditions. Economic necessity and the ethical and social awakening have overborne the conservative traditions that sought to confine women to the nursery, the kitchen, and the church.

The privilege has, so far, made no great difference to the profession. The woman student of medicine must, of course, comply with the regular matriculation requirements, by presenting the leaving-certificate of a nine-year secondary school. Up to very recently, women had to procure the requisite training chiefly through private study and tuition, a procedure almost prohibitive on account of the expense. The total enrolment of women in the medical faculties of Germany has therefore been small, and no insignificant proportion foreigners.[2] The figures for four successive recent semesters are as follows:

1908–1909 (winter semester)	188
1909 (summer semester)	183
1909–1910 (winter semester)	266 (202 being fully matriculated)
1910 (summer semester)	241
1911 (summer semester)	268 (253 being fully matriculated)

But important steps were taken by the Prussian government to provide adequate secondary education for girls when, in 1908, the university bars were let down. The upper girls' school had consisted of ten classes; the newly established secondary institutions intended to lead into the university, articulate with the seventh class of the upper girls' school. Instead of going into the eighth class, the prospective university student enters a girls' *Gymnasium*, offering a six years' course. These *Gymnasien*, of which there are now thirty-one, are of three types, following the lines of the corresponding schools for boys: the classical *Gymnasium*, with a curriculum largely composed of German, Latin, French, and Greek; the *Realgymnasium*, with Latin, French, English, mathematics, and science; and the *Higher Realschule*, with French, English, German, science, and mathematics. History, geography, and religion are common to all in practically

[1] In Prussia since the winter semester, 1908.

[2] This is likewise the case in France and Switzerland, many of the women students in medicine being Russians.

the same amounts. Prussia thus at this moment provides the same sort of secondary school facilities for both sexes, though so far the higher schools for girls are not yet numerous. The Prussian girl, like the Prussian boy, may get a university education on the basis of a secondary education largely made up of Latin and Greek, or one containing Latin and no Greek, or one containing neither Latin nor Greek.[1]

The number of women practitioners is inconsiderable, but gradually increasing. Between 1900 and 1905, 46 women qualified, 13 of them locating in Berlin;[2] in 1908, 55 were in active practice; in 1909, 69; in 1910, 85, of whom 52 were engaged in private practice, the remaining 33 being attached to institutions. The most recent statistics for Austria show 80 registered women physicians, as compared with 9 in 1905, 34 in 1908; 39 of the 80 are settled in Vienna.[3] The proportion of students who subsequently engage in practice is, as far as Swiss experience goes, apparently not large.

For these small numbers no special provision is anywhere made, excepting in Berlin, where women students possess a dissecting-room of their own. Elsewhere, men and women attend the same classes and demonstrations, and, as at Vienna and Paris, dissect at the same tables. Co-education is the general practice on the Continent. Three hundred women mingle on even terms with three thousand men students in the hospitals of Paris; in Rome, Geneva, Brussels, Upsala, Copenhagen, and the Swiss universities, no distinction whatever is made between the sexes. The enrolment of women in the philosophical faculty of the universities is so rapidly increasing, however, that the advantages and disadvantages of co-education as against segregation of sexes are now occasionally discussed.[4]

Both methods are illustrated in Great Britain, where a long contest, dotted with highly diverting incidents, has now resulted in opening to women all qualifications except those of the ancient universities, Oxford and Cambridge, neither of which will examine women medical students, though Cambridge is willing to teach them. From the first, women have been registrable on the same basis as men, "practically, though probably not intentionally,"[5] according to a memorandum filed in 1884 by the then president of the General Medical Council. The first Medical Register published in compliance with the Act of 1858 contains the name of one woman practitioner, a graduate of Geneva; seven years later, the Apothecaries' Society of London examined and qualified the second. Educational facilities for women were as yet non-existent. Edinburgh accepted several women as students in 1870, but a student riot and an

[1] For a brief account, see J. F. Brown: *Training of Teachers for Secondary Schools*, pp. 13, 19 (New York, 1911); also C. W. Prettyman: "Higher Girls' Schools of Prussia," *Teacher's College Record* (New York, May, 1911).

[2] Rabe, supra, p. 85.

[3] Figures taken from *Aerztliches Vereinsblatt*, *Wiener Klinische Wochenschrift*, and other similar publications.

[4] See, for example, Waldeyer: *Ueber Aufgaben und Stellung unserer Universitäten*, pp. 12, etc. (Berlin, 1898).

[5] *Memorandum concerning Medical Education of Women in England*, March, 1884, p. 3.

unfavorable judicial decision abruptly terminated its connection with the medical training of women. Feeling ran so high at the time that the entire board of examiners of the Royal College of Surgeons resigned rather than examine two women who came up for examination in midwifery. Favorable action on the petition of women to be examined for their qualifications was taken by the London Royal Colleges only in 1909.

The most important step on the educational side occurred in 1874, when the London School of Medicine for Women began its career with fourteen students. Three years later, the school perfected a close relation with the Royal Free Hospital, while in the same year the College of Physicians in Ireland opened its qualifying examination, and London University its degree examination, to women. Resident posts in the Royal Free were made accessible to women in 1896. Up to the present time, nearly one thousand students have passed through the institution. At present, the hospital contains 165 beds, with out-patient, casualty, and externe midwifery departments; in addition, fifteen special hospitals in London admit its women students to their wards. The laboratory facilities compare favorably with those of other London schools; the pathological department, in which every student is required to serve a three months' clerkship, forms a separate establishment adjoining the hospital; a few minutes' walk removed is the medical school building. Its provision for anatomy, physics, and chemistry follows the usual London lines. Physiology is best represented. Individual provision in histological and chemical work is made for 62 students; 18 students can be accommodated at one time in experimental work. The teaching follows the sound British tradition, practical work leading the way. Research, also, is in progress. Unfortunately, English women are too largely sympathetic with anti-vivisection to make it prudent for a school largely maintained by subscriptions to seek a vivisection license.

To the other hospital schools of London, no women are admitted. But of the provincial universities, Durham, Manchester, Liverpool, Birmingham, Leeds, and Bristol are co-educational. Their enrolment of women students of medicine is slowly creeping up. In the five-year period, 1901–1905, 371 women were registered as students in the United Kingdom; in a period of equal length, 1906–1910, 397. There was a decrease in England and Wales,—from 172 to 159; practically no change in Scotland,—171 and 169, respectively; in Ireland, the registration rose from 28 to 69.[1] Nowhere, except at the Royal Free Hospital, do women share hospital appointments subsequent to graduation. This obvious anomaly still remains to be removed.

The unhappy relations of the University of Edinburgh to the subject have already been mentioned. In 1872, the courts decided that the university could not give its degree to women; twenty years later, this difficulty was overcome through action of the Scottish Universities Commission. The university will now examine, but not teach, women in medicine,—a decision which on practical grounds is perhaps not to be

[1] Figures compiled from annual students' registers.

regretted, for its present facilities do not suffice for its male students. An effort, meanwhile, to found a separate medical college for women in Edinburgh has proved unsuccessful. At this date, the instruction of women in Edinburgh is in the hands of the extra-mural lecturers, whose laboratory facilities are meagre; three wards of the Royal Infirmary are reserved for women students, one of 46 beds in surgery, one of 40 in medicine, a third of 30 beds in gynecology. In view of the inadequacy of the clinical resources of Edinburgh, this arrangement can hardly be regarded as fortunate.[1] Scotch women would doubtless do better for themselves to reject the hard conditions unavoidably imposed at Edinburgh, in favor of Glasgow, where at Queen Margaret's College and the Royal Infirmary the university provides facilities quite as complete as those enjoyed by the other sex; or in favor of Aberdeen, Dundee, and St. Andrew's, where no difficulties are encountered; in these latter, the women students, forming only a small proportion, work alongside of men in the clinics and in all the laboratories except anatomy. Practically the important thing would appear to be to train women students well rather than merely to train them in Edinburgh.[2]

A medical education at the Royal Free Hospital in London costs £161, if the composition fee is paid; £10 more, if paid in instalments; books and laboratory fees bring the sum up to an estimated total of £225. Official and hospital posts in considerable number and variety are being so rapidly opened to, and established for, women that the financial prospects of women physicians are at the moment rather more cheerful than those of men. In Scotland, a medical education is somewhat less expensive: the total fees for a five years' course at Glasgow amount to about £120.

There are at this date about 600 women practitioners in England and Scotland, distributed as follows: between 1908 and 1910, 70 women registered as practitioners in Scotland; between 1906 and 1910, 16 in Ireland; between 1907 and 1910, 75 in London. The Medical Directory for 1911 gives the number and distribution of qualified practitioners as follows:[3]

London 187	Provinces 272	Wales 10	Scotland 127	Ireland 48

It is interesting to observe, as doubtless significant of the quality of the material of which this body of women practitioners is composed, that women complete their studies in shorter time than men. Of the 117 who have qualified since 1900, 66 per cent qualified in between five and six years, 19 per cent in between six and seven years.[4]

[1] It must be admitted, however, that the Edinburgh authorities appear to no slight extent to be governed in their position by hostility to co-education in medicine. See testimony of the principal, Sir William Turner, in *Minutes of Evidence taken before Committee on Scottish Universities*, pp. 75, 76 (London, 1910).

[2] Women may be licensed to practise after examination by the Royal Colleges, but membership and fellowship are denied to them.

[3] These figures were gathered for me by Miss K. Haslam, M.D., Secretary of the Association of Registered Medical Women.

[4] *Minutes of Evidence taken by Royal Commission on London University* (Third Report), p. 334.

APPENDIX

APPENDIX

Statistical Tables with regard to the Cost of Medical Education in the Universities of Prussia and Bavaria supplied by the Governments of those countries for the information of the Royal Commission on University Education in London, at the request of Professor Friedrich von Müller,—reprinted here with the permission of the Controller of the H. B. M. Stationery Office and of the Commission.

CLASSIFICATION OF THE EXPENDITURE ON THE MEDICAL FACULTIES IN THE PRUSSIAN UNIVERSITIES.

A. Standing Charges at 1st of April, 1911. (1st Statement.)

UNIVERSITY.	Current Expenses of the Medical Faculty.						The Totals in column 4 are defrayed from the following sources in the proportions given below:				*Numbers of Matriculated Medical Students for Session 1910-11.*	Expenditure per annum on each Medical Student.			
	Personal Expenses.		*Equipment Expenses of the Institutes.*		*Total of columns 2 and 3.*		*From the Income of the University.*		*From State Funds.*			*Total.*		*Out of State Funds.*	
1.	2.		3.		4.		5.		6.		7.	8.		9.	
	M.	Pf.	M.	Pf.	M.	Pf.	M.	Pf.	M.	Pf.		M.	Pf.	M.	Pf.
Königsberg	177,050	0	507,217	0	684,267	0	213,208	0	471,059	0	370	1,850	0	1,270	C
Berlin and Charité Hospital	713,302	0	2,963,760	13	3,677,062	13	1,702,751	65	1,974,310	48	1,995	1,840	0	989	0
Greifswald	165,725	0	511,695	0	677,420	0	235,259	48	442,160	52	248	2,730	0	1,780	0
Breslau	258,720	0	772,384	0	1,031,104	0	410,675	0	620,429	0	530	1,945	0	1,170	0
Halle	223,526	0	709,351	0	932,877	0	465,441	0	467,436	0	325	2,808	0	1,437	0
Kiel	219,225	0	811,634	0	1,030,859	0	505,174	0	525,685	0	535	1,926	0	982	0
Göttingen	145,350	0	498,015	0	643,365	0	282,480	0	360,885	0	277	2,322	0	1,302	0
Marburg	191,200	0	447,314	0	638,514	0	207,201	50	431,312	50	383	1,667	0	1,126	0
Bonn	206,660	0	638,855	0	845,515	0	387,169	0	458,346	0	496	1,704	0	924	0
Münster	17,640	0	10,500	0	28,140	0			28,140	0	206	136	0	136	0
Total	2,318,398	0	7,870,725	13	10,189,123	13	4,409,359	63	5,779,763	50	5,365	1,900	0	1,077	0

Remarks. To the amounts in columns 3 and 6 must be added the cost of the maintenance of the institute buildings, which absorbs at least half of the estimated building funds, and amounts altogether to 391,459 M.

The participation of the medical students, particularly in the non-clinical session, in the lectures and practical work in some natural science institutes (of the philosophical faculty) affects both the accommodation required and the equipment expenses of these institutes, and the number and composition of the teaching staff in the philosophical faculty. It is impossible to estimate how much the expenses of this faculty are increased by the presence of medical students.

B. Capital Expenditure on Account of the Medical Faculties for the Years 1887 to 1911 inclusive. (2d Statement.)

UNIVERSITY.	*For the Purchase of Land.*		*For Buildings and Fittings.*		*For Instruments and Apparatus.*		*Deficits.*		*Total.*	
	M.	Pf.	M.	Pf.	M.	Pf.	M.	Pf.	M.	Pf.
Königsberg	246,000	0	2,138,265	0	200,700	0	225,614	0	2,810,579	0
Berlin and Charité Hospital	1,057,410	0	15,254,655	0	729,650	0	3,487,830	0	20,529,545	0
Greifswald	215,150	0	2,779,233	0	154,300	0	176,605	0	3,325,288	0
Breslau	377,200	0	6,178,420	0	171,400	0	351,675	0	7,078,695	0
Carried forward	1,895,760	0	26,350,573	0	1,256,050	0	4,241,724	0	33,744,107	0

B. Capital Expenditure on Account of the Medical Faculties for the Years 1887 to 1911 inclusive. (2d Statement) [*continued*].

University.	*For the Purchase of Land.*		*For Buildings and Fittings.*		*For Instruments and Apparatus.*		*Deficits.*		*Total.*	
	M.	Pf.	M.	Pf.	M.	Pf.	M.	Pf.	M.	Pf.
Brought forward	1,895,760	0	26,350,573	0	1,256,050	0	4,241,724	0	33,744,107	0
Halle	296,512	0	2,069,300	0	145,090	0	115,420	0	2,626,322	0
Kiel	574,800	0	4,230,230	0	140,470	0	380,460	0	5,325,960	0
Göttingen			3,187,820	0	96,150	0	344,590	0	3,628,560	0
Marburg	75,716	0	2,473,340	0	105,100	0	265,106	0	2,919,262	0
Bonn	14,500	0	2,332,465	0	203,450	0	121,519	0	2,671,934	0
Munster					11,000	0	33,460	0	44,460	0
Total	2,857,288	0	40,643,728	0	1,957,310	0	5,502,279	0	50,960,605	0
Total of miscellaneous contributions for 1887–1911									508,000	0
Sum total of capital expenditure									51,468,605	0

1. Königsberg University.

Institute.	Number and Designation of the		State Contributions to the Institute for the following purposes:						*Private Income of the Institute.*		*Total of estimated Income and Expenditure of the Institute (columns 6 and 7).*	
	Scientific Offices (in addition to the Director).	*Other Offices.*	*Personal Expenses.*		*Equipment Expenses.*		*Total of columns 4 and 5.*					
1.	2.	3.	4.		5.		6.		7.		8.	
			M.	Pf.	M.	Pf.	M.	Pf.	M.	Pf.	M.	Pf.
Anatomical Institute.	1 prosector, 2 assistants.	2 servants.	10,990	0	9,989	0	20,979	0			20,979	0
Physiological Institute.	2 assistants.	1 servant.	4,560	0	5,840	0	10,400	0			10,400	0
Pathological Institute.	2 assistants.	1 servant.	4,710	0	6,960	0	11,670	0			11,670	0
Pharmacological Institute and instruction in Physiological and Pathological Chemistry.	2 assistants.	1 servant.	4,780	0	4,540	0	9,320	0			9,320	0
Hygienic Institute.	2 assistants.	1 servant.	4,710	0	7,990	0	12,700	0			12,700	0
Medical Clinic.	1 head physician, 6 assistants.	1 porter.	12,840	0	49,651	0	62,491	0	65,429	0	127,920	0
Surgical Clinic.	1 head surgeon, 4 assistants.	1 porter.	10,050	0	87,049	0	97,099	0	55,051	0	152,150	0
Women's Clinic.	1 obstetrician, 1 head doctor, 3 assistants.	1 porter.	11,010	0	60,305	0	71,315	0	52,295	0	123,610	0
Eye Clinic.	1 head surgeon, 3 assistants.	1 porter.	8,840	0	32,117	0	40,957	0	34,233	0	75,190	0
Psychiatrical instruction.	2 assistants.		3,000	0	7,368	0	10,368	0			10,368	0
Institute for Forensic Medicine.		1 servant.	1,560	0	2,300	0	3,860	0			3,860	0
Ear Clinic.	1 assistant.		1,500	0	12,500	0	14,000	0	6,200	0	20,200	0
* Out-patients' Department for Skin Diseases.					3,300	0	3,300	0			3,300	0
* Out-patients' Department for the Diseases of Children.					2,000	0	2,000	0			2,000	0
Carried forward			78,550	0	291,909	0	370,459	0	213,208	0	583,667	0

* [illegible]

1. Königsberg University [*continued*].

INSTITUTE.	Number and Designation of the		State Contributions to the Institute for the following purposes:			Private Income of the Institute.	Total of estimated Income and Expenditure of the Institute (columns 6 and 7).
	Scientific Offices (in addition to the Director).	*Other Offices.*	*Personal Expenses.*	*Equipment Expenses.*	*Total of Columns 4 and 5.*		
1.	2.	3.	4.	5.	6.	7.	8.
			M. Pf.	M. Pf.	M. Pf.	M. Pf.	M. Pf.
Brought forward			78,550 0	291,909 0	370,459 0	213,208 0	583,667 0
* Dental Institute.				2,100 0	2,100 0		2,100 0
Total			78,550 0	294,009 0	372,559 0	213,208 0	585,767 0
† Salaries of the professors in the Medical Faculty.	11 ordinary, 9 extraordinary, and district superintendent.		98,500 0		98,500 0		98,500 0
Sum total			177,050 0	294,009 0	471,059 0	213,208 0	684,267 0

Number of matriculated medical students according to the average of the summer and winter sessions, 1910 370
Total expenditure for the year on one medical student .... 1850 M.
Out of state funds .... 1270 M.

2. Berlin University and the Charité Hospital.

Anatomical Institute.	2 prosectors, 1 assistant and custodian, 3 assistants.	1 inspector, 1 preparator, 3 servants.	20,600 0	37,076 0	57,676 0	1,000 0	58,676 0
Anatomical-Biological Institute.	1 prosector, 2 assistants.	1 preparator, 1 servant.	7,040 0	11,300 0	18,340 0		18,340 0
Physiological Institute.	1 district superintendent, 5 assistants.	1 secretary, 5 servants.	22,360 0	63,116 0	85,476 0		85,476 0
Pharmacological Institute.	2 assistants.	2 servants.	6,180 0	14,002 0	20,182 0		20,182 0
Hygienic Institute.	2 district superintendents, 2 assistants.	1 clerk, 5 servants, 1 mechanician and machinist.	17,150 0	33,840 0	50,990 0		50,990 0
Out-patients' Department for Internal Medicine (comprising a Medical Out-patients' Department, a Hydro-therapeutic Department, and an Out-patients' Department for Pulmonary Diseases).	7 assistants (that is, 4 in the Medical Out-patients' Department, 3 in the Hydro-therapeutic Department).	1 clerk of inspection office, 1 servant, 1 bath attendant.	19,540 0	35,549 0	55,089 0	53,201 0	108,290 0
Royal Hospital (comprising the Surgical, Eye, and Ear Clinics).	1 head assistant, 14 assistants (that is, 1 head assistant, 6 assistants in the Surgical Clinic, 5 assistants in the Eye Clinic, 3 assistants in the Ear Clinic).	1 administrative director (in the sub-office). 2 clerks of inspection office, 1 clerk, 1 machinist, 1 housekeeper, 3 porters, 1 anatomy attendant.	45,230 0	131,689 0	176,919 0	272,503 0	449,422 0
Carried forward			138,100 0	326,572 0	464,672 0	326,704 0	791,376 0

* Subvention.

† The average salary of the ordinary professors amounts to 5500 M., of the extraordinary professors (district superintendent) to 3500 M., with additional allowance for a house when an official residence is not provided. The salaries of the ordinary professors vary from 4200 to 7200 M., and those of the extraordinary professors from 1800 to 4200 M.

2. Berlin University and the Charité Hospital [*continued*].

INSTITUTE.	Number and Designation of the		State Contributions to the Institute for the following purposes:			Private Income of the Institute.	Total of estimated Income and Expenditure of the Institute (columns 6 and 7).
	Scientific Offices (in addition to the Director).	*Other Offices.*	*Personal Expenses.*	*Equipment Expenses.*	*Total of columns 4 and 5.*		
1.	2.	3.	4.	5.	6.	7.	8.
			M. Pf.	M. Pf.	M. Pf.	M. Pf.	M. Pf.
Brought forward			138,100 0	326,572 0	464,672 0	326,704 0	791,376 0
Women's Clinic.	8 assistants.	2 clerks of inspection office, 1 porter.	26,170 0	113,847 0	140,017 0	105,853 0	245,870 0
Collection of surgical and obstetrical instruments and bandages.				1,360 0	1,360 0		1,360 0
* Institute for Orthopedical Surgery.				4,000 0	4,000 0		4,000 0
Institute for Practical Instruction in State Pharmacology.	2 assistants.	1 servant.	5,180 0	1,830 0	7,010 0		7,010 0
Out-patients' Department for Throat and Nose Diseases.	2 assistants.		3,000 0	3,074 0	6,074 0	3,000 0	9,074 0
Institute for Röntgen Ray Investigations.	1 assistant.		3,400 0	8,250 0	11,650 0		11,650 0
Dental Institute.	9 assistants.	3 servants.	19,760 0	13,974 0	33,734 0	47,826 0	81,560 0
* Institute for Mechano-therapeutics.				2,500 0	2,500 0		2,500 0
† *The Charité Hospital*, with the following University Institutes: Pathological-Anatomical Institute. 2 Medical Clinics with Out-patients' Department. 1 Surgical Clinic. 1 Clinic for Psychiatrical and Nervous Diseases. 1 Women's Clinic. 1 Children's Clinic. 1 Clinic for Skin Diseases. 1 Eye Clinic. 1 Clinic for Throat and Nose Diseases. 1 Ear Clinic.	*Pathological Institute:* 2 district superintendents, 1 custodian, 6 assistants. *I. Medical Clinic:* 1 head physician, 2 assistants. *II. Medical Clinic:* 1 head physician, 3 assistants. *Surgical Clinic:* 1 head surgeon, 4 assistants. *Psychiatrical Clinic:* 1 assistant. *Women's Clinic:* 1 head doctor, 5 assistants. *Children's Clinic:* 3 assistants. *Skin Clinic:* 1 head doctor, 3 assistants. *Eye Clinic:* 1 assistant.	1 medical director, 1 managing director, 1 head apothecary, 3 dispensers, 3 ministers of religion, 13 clerks and cashiers, 1 controller's clerk, 1 superintendent's clerk, 4 assistant clerks, 7 departmental clerks, 1 preparator, 2 servants in the Pathological Institute, 1 servant in the Psychiatrical Clinic, 1 machinist, 1 sacristan, 1 gardener, 3 office boys, 1 foreman, 7 porters, 1 assistant clerk.	245,842 0	785,601 48	1,031,443 48	1,219,368 65	2,250,812 13
Carried forward			441,452 0	1,261,008 48	1,702,460 48	1,702,751 65	3,405,212 13

* Subvention.

† The Charité Hospital also provides the instruction of military surgeons. Staff doctors are employed as assistants.

2. Berlin University and the Charité Hospital [*continued*].

INSTITUTE.	Number and Designation of the		State Contributions to the Institute for the following purposes:			*Private Income of the Institute.*	*Total of estimated Income and Expenditure of the Institute (columns 6 and 7).*
	Scientific Offices (in addition to the Director).	*Other Offices.*	*Personal Expenses.*	*Equipment Expenses.*	*Total of columns 4 and 5.*		
1.	2.	3.	4.	5.	6.	7.	8.
			M. Pf.	M. Pf.	M. Pf.	M. Pf.	M. Pf.
Brought forward	*Ear Clinic:* 1 assistant.	*In Sub-Office* 1 justiciary, 1 Catholic priest, 1 organist.	441,452 0	1,261,008 48	1,702,460 48	1,702,751 65	3,405,212 13
Total			441,452 0	1,261,008 48	1,702,460 48	1,702,751 65	3,405,212 13
* Salaries of the professors in the Medical Faculty.	17 ordinary, 32 extraordinary, and district superintendent.		271,850 0		271,850 0		271,850 0
Sum total			713,302 0	1,261,008 48	1,974,310 48	1,702,751 65	3,677,062 13

Number of matriculated medical students (including the students of the Kaiser Wilhelm's Akademie for the training of army doctors) according to the average of the summer and winter sessions, 1910 1995
Total expenditure for the year on one medical student .... 1840 M.
Out of state funds .... 989 M.

3. Greifswald University.

Anatomical Institute	1 district superintendent, 1 prosector.	1 preparator, 1 servant.	5,940 0	11,091 0	17,031 0		17,031 0
Physiological Institute.	1 assistant.	1 servant.	3,000 0	4,868 0	7,868 0		7,868 0
Pathological Institute.	2 assistants.	1 servant.	4,375 0	8,686 0	13,061 0		13,061 0
Pharmacological Institute.	1 assistant.	1 servant.	3,350 0	3,250 0	6,600 0		6,600 0
Hygienic Institute.	2 assistants.	1 servant.	4,640 0	6,225 0	10,865 0		10,865 0
University Hospital (comprising the Medical and Surgical Clinics).	*Medical Clinic:* 1 head physician, 4 assistants. *Surgical Clinic:* 1 head surgeon, 6 assistants.	2 clerks of inspection office, 1 machine minder, 1 servant.	29,840 0	122,855 32	152,695 32	141,756 68	294,452 0
Women's Clinic.	1 head doctor, 3 assistants.	1 steward.	8,820 0	44,713 60	53,533 60	24,737 40	78,271 0
Clinic for Psychiatrical and Nervous Diseases.	1 head doctor, 2 assistants.	1 inspector, 1 porter, 1 attendant, 1 female attendant.	15,770 0	39,779 0	55,549 0	36,821 0	92,370 0
Eye Clinic.	3 assistants.		4,850 0	20,027 60	24.877 60	31,944 40	56,822 0
† Children's Clinic.				12.240 0	12.240 0		12,240 0
† Out-patients' Department for Skin Diseases.				1,800 0	1,800 0		1,800 0
Carried forward			80,585 0	275,535 52	356,120 52	235,259 48	591,380 0

* The average salaries of the ordinary professors amount to 6500 M., of the extraordinary professors (district superintendent) to 3500 M., with additional allowance for a house when an official residence is not provided. The salaries of the ordinary professors vary from 4800 to 9000 M., and those of the extraordinary professors from 1500 to 4800 M.

† Subvention.

3. Greifswald University [*continued*].

INSTITUTE.	Number and Designation of the: *Scientific Offices (in addition to the Director).*	*Other Offices.*	State Contributions to the Institute for the following purposes: *Personal Expenses.*	*Equipment Expenses.*	*Total of columns 4 and 5.*	*Private Income of the Institute*	*Total of estimated Income and Expenditure of the Institute (columns 6 and 7).*
1.	2.	3.	4.	5.	6.	7.	8.
			M. Pf.	M. Pf.	M. Pf.	M. Pf.	M. Pf.
Brought forward			80,585 0	275,535 52	356,120 52	235,259 48	591,380 0
* Instruction in Forensic Medicine.				900	900 0		900 0
Total			80,585 0	276,435 52	357,020 52	235,259 48	592,280 0
† Salaries of the professors in the Medical Faculty.	12 ordinary, 5 extraordinary, and district superintendent.		85,140 0		85,140 0		85,140 0
Sum total			165,725 0	276,435 52	442,160 52	235,259 48	677,420 0

Number of matriculated medical students according to the average of the summer and winter sessions, 1910 248
Total expenditure for the year on one medical student .... 2730 M.
Out of state funds .... 1780 M.

4. Breslau University.

Anatomical Institute.	1 district superintendent, 1 prosector, 2 assistants.	2 servants.	9,320 0	19,510 0	28,830 0	2,165 0	30,995 0
Physiological Institute.	1 district superintendent, 2 assistants.	2 servants.	6,200 0	8,868 0	15,068 0		15,068 0
Pathological Institute.	3 assistants.	2 servants.	7,770 0	9,047 0	16,817 0	311 0	17,128 0
Pharmacological Institute.	1 assistant.	1 servant.	3,490 0	5,910 0	9,400 0		9,400 0
Hygienic Institute.	4 assistants.	2 servants.	11,670 0	13,703 0	25,373 0		25,373 0
Clinical Institutes (comprising the Medical Clinic, the Surgical Clinic, the Eye Clinic, the Women's Clinic, the Clinic for Diseases of the Skin, the Children's Clinic, and the Ear Clinic).	*Medical Clinic:* 1 head physician, 4 assistants. *Surgical Clinic:* 1 head surgeon, 4 assistants. *Eye Clinic:* 3 assistants. *Women's Clinic:* 1 head doctor, 4 assistants. *Clinic for Skin Diseases:* 1 head doctor, 3 assistants. *Children's Clinic:* 3 assistants. *Ear Clinic:* 2 assistants.	3 clerks of inspection office, 2 assistant clerks, 3 dispensers, 7 caretakers, 1 servant, 1 machinist.	81,530 0	261,502 0	343,032 0	341,418 0	684,450 0
Carried forward			119,980 0	318,540 0	438,520 0	343,894 0	782,414 0

* Subvention.

† Average salary of the professors is as at Königsberg. The salaries of the ordinary professors vary from 4000 to [illegible] M., and those of the extraordinary professors from 2690 to 4000 M.

4. Breslau University [*continued*].

INSTITUTE.	Number and Designation of the		State Contributions to the Institute for the following purposes:			Private Income of the Institute.	Total of estimated Income and Expenditure of the Institute (columns 6 and 7).
	Scientific Offices (in addition to the Director).	*Other Offices.*	*Personal Expenses.*	*Equipment Expenses.*	*Total of columns 4 and 5.*		
1.	2.	3.	4.	5.	6.	7.	8.
			M. Pf.	M. Pf.	M. Pf.	M. Pf.	M. Pf.
Brought forward			119,980 0	318,540 0	438,520 0	343,894 0	782,414 0
Clinic for Psychiatrical and Nervous Diseases.	1 head doctor, 3 assistants.	2 clerks of inspection office, 1 machinist, 1 porter, 1 attendant, 1 female attendant.	22,180 0	33,869 0	56,049 0	64,981 0	121,030 0
Dental Institute.	3 assistants.		4,500 0	5,800 0	10,300 0	1,800 0	12,100 0
Institute for Forensic Medicine.		1 servant.	1,560 0	3,500 0	5,060 0		5,060 0
Total			148,220 0	361,709 0	509,929 0	410,675 0	920,604 0
* Salaries of the professors in the Medical Faculty.	14 ordinary, 11 extraordinary, and district superintendent.		110,500 0		110,500 0		110,500 0
Sum total			258,720 0	361,709 0	620,429 0	410,675 0	1,031,104 0

Number of matriculated medical students according to the average of the summer and winter sessions, 1910 530
Total expenditure for the year on one medical student .... 1945 M.
Out of state funds .... 1170 M.

5. Halle University.

Anatomical Institute.	1 district superintendent, 1 prosector, 2 assistants.	1 preparator, 2 servants.	11,560 0	12,739 0	24,299 0	390 0	24,689 0
Physiological Institute.	2 assistants.	1 servant.	4,990 0	3,544 0	8,534 0		8,534 0
Hygienic Institute.	1 assistant.	1 servant.	3,810 0	5,250 0	9,060 0		9,060 0
Pathological Institute.	2 assistants.	1 servant.	4,990 0	6,594 0	11,584 0	20 0	11,604 0
Pharmacological Institute.	2 assistants.	1 servant.	4,710 0	4,000 0	8,710 0		8,710 0
Clinical Institutes (comprising the Medical, Surgical, Women's, Eye, and Ear Clinics).	*Medical Clinic:* 1 head physician, 10 assistants. *Surgical Clinic:* 1 head surgeon, 5 assistants. *Women's Clinic:* 1 head doctor, 4 assistants. *Eye Clinic:* 3 assistants. *Ear Clinic:* 2 assistants.	2 clerks of inspection office, 2 assistant clerks, 1 first-class mechanician, 1 servant, 5 porters.	68,520 0	164,333 0	232,853 0	338,135 0	570,988 0
Carried forward			98,580 0	196,460 0	295,040 0	338,545 0	633,585 0

* Average salary of the professors is as at Königsberg. The salaries of the ordinary professors vary from 3900 to 6600 M., and those of the extraordinary professors from 2400 to 4000 M.

5. Halle University [*continued*].

Institute. 1.	Number and designation of the Scientific Offices (in addition to the Director). 2.	Number and designation of the Other Offices. 3.	State Contributions to the Institute for the following purposes: Personal Expenses. 4.	Equipment Expenses. 5.	Total of columns 4 and 5. 6.	Private Income of the Institute. 7.	Total of estimated Income and Expenditure of the Institute (columns 6 and 7). 8.
			M. Pf.	M. Pf.	M. Pf.	M. Pf.	M. Pf.
Brought forward			98,580 0	196,460 0	295,040 0	338,545 0	633,585 0
Clinic for Psychiatrical and Nervous Diseases.	1 head doctor, 4 assistants.	1 clerk of inspection office. 2 assistant clerks, 1 first-class mechanician, 1 porter, 1 servant, 1 attendant, 1 female attendant.	24,746 0	38,450 0	63,196 0	126,896 0	190,092 0
Instruction in Forensic Medicine.				900 0	900 0		900 0
* Out-patients' Department for Skin Diseases.				6,000 0	6,000 0		6,000 0
* Dental Institute.				2,100 0	2,100 0		2,100 0
Total			123,326 0	243,910 0	367,236 0	465,441 0	832,677 0
† Salaries of the professors in the Medical Faculty.	14 ordinary, 7 extraordinary, and district superintendent.		100,200 0		100,200 0		100,200 0
Sum total			223,526 0	243,910 0	467,436 0	465,441 0	932,877 0

Number of matriculated medical students according to the average of the summer and winter sessions, 1910 325
Total expenditure for the year on one medical student .... 2808 M.
Out of state funds .... 1437 M.

6. Kiel University.

Institute.	Scientific Offices.	Other Offices.	Personal Expenses.	Equipment Expenses.	Total of columns 4 and 5.	Private Income.	Total.
Anatomical Institute.	1 district superintendent, 1 prosector, 1 assistant.	1 servant.	5,215 0	10,920 0	16,135 0		16,135 0
Physiological Institute.	1 district superintendent, 2 assistants.	1 servant.	4,710 0	5,378 0	10,088 0		10,088 0
Pathological Institute.	1 district superintendent, 4 assistants.	1 servant.	7,560 0	13,000 0	20,560 0		20,560 0
Pharmacological Institute.	1 assistant.	1 servant.	3,140 0	3,600 0	6,740 0		6,740 0
Hygienic Institute.	3 assistants.	1 servant.	6,060 0	9,300 0	15,360 0		15,360 0
Academical Medical Institutions (comprising the Medical and Surgical Clinics, the Women's Clinic, with Institution for the Instruction of Midwifery, and the Clinic for Skin Diseases).	*Medical Clinic:* 1 head physician, 6 assistants. *Surgical Clinic:* 1 head surgeon, 5 assistants. *Eye Clinic:* 3 assistants.	3 clerks of inspection office, 1 assistant clerk, 2 porters, 1 first-class mechanician.	54,110 0	207,296 0	261,406 0	396,940 0	658,346 0
Carried forward			80,795 0	249,494 0	330,289 0	396,940 0	727,229 0

* Subventions.

† Average salary of the professors is as at Königsberg. The salaries of the ordinary professors vary from 4200 to 7200 M., and those of the extraordinary professors from 600 to 3100 M.

6. Kiel University [*continued*].

INSTITUTE.	Number and Designation of the		State Contributions to the Institute for the following purposes:			*Private Income of the Institute.*	*Total of estimated Income and Expenditure of the Institute (columns 6 and 7).*
	Scientific Offices (in addition to the Director).	*Other Offices.*	*Personal Expenses.*	*Equipment Expenses.*	*Total of columns 4 and 5.*		
1.	2.	3.	4.	5.	6.	7.	8.
			M. Pf.	M. Pf.	M. Pf.	M. Pf.	M. Pf.
Brought forward			80,795 0	249,494 0	330,289 0	396,940 0	727,229 0
	Women's Clinic: 1 head doctor, 3 assistants. *Institution for Instruction in Midwifery:* 1 assistant. *Skin Clinic:* 2 assistants.						
Clinic for Psychiatrical and Nervous Diseases.	1 head doctor, 4 assistants.	2 clerks of inspection office, 1 assistant clerk, 1 first-class mechanician, 1 attendant cashier's office, 1 porter, 1 attendant, 1 female attendant.	27,490 0	33,166 0	60,656 0	108,234 0	168,890 0
* Out-patients' Department for Ear, Throat, and Nose Diseases.				6,000 0	6,000 0		6,000 0
* Children's Out-patients' Department.				13,000 0	13,000 0		13,000 0
Instruction in Dentistry.				2,100 0	2,100 0		2,100 0
Institute for Forensic Medicine.				2,700 0	2,700 0		2,700 0
Total			108,285 0	306,460 0	414,745 0	505,174 0	919,919 0
† Salaries of the professors in the Medical Faculty.	14 ordinary, 8 extraordinary, and district superintendent.		110,940 0		110,940 0		110,940 0
Sum total			219,225 0	306,460 0	525,685 0	505,174 0	1,030,859 0

Number of matriculated medical students according to the average of the summer and winter sessions, 1910 535
Total expenditure for the year on one medical student....1926 M.
Out of state funds....982 M.

7. Göttingen University.

Anatomical Institute.	1 district superintendent, 1 prosector, 1 assistant.	1 preparator, 1 servant.	7,220 0	14,150 0	21,370 0		21,370 0
Physiological Institute.	2 assistants.	1 servant.	4,570 0	6,038 0	10,608 0		10,608 0
Carried forward			11,790 0	20,188 0	31,978 0		31,978 0

* Subvention.

† Average salary of the professors is as at Königsberg. The salaries of the ordinary professors vary from 3000 to 6600 M., and those of the extraordinary professors from 2600 to 4800 M.

7. Göttingen University [*continued*].

INSTITUTE.	Number and Designation of the: *Scientific Offices (in addition to the Director).*	Number and Designation of the: *Other Offices.*	State Contributions to the Institute for the following purposes: *Personal Expenses.*	State Contributions: *Equipment Expenses.*	State Contributions: *Total of columns 4 and 5.*	*Private Income of the Institute.*	*Total of estimated Income and Expenditure of the Institute (columns 6 and 7).*
1.	2.	3.	4.	5.	6.	7.	8.
			M. Pf.	M. Pf.	M. Pf.	M. Pf.	M. Pf.
Brought forward			11,790 0	20,188 0	31,978 0		31,978 0
Pathological Institute.	2 assistants.	1 servant.	4,850 0	5,826 0	10,676 0		10,676 0
Pharmacological Institute.	1 assistant.	1 servant.	3,000 0	4,085 0	7,085 0		7,085 0
Hygienic Institute.	1 assistant.	1 servant.	3,950 0	4,800 0	8,750 0		8,750 0
United University Clinics (comprising the Medical, Surgical, Women's, and Children's Clinics).	*Medical Clinic:* 1 head physician, 5 assistants. *Surgical Clinic:* 5 assistants. *Women's Clinic:* 1 head doctor, 3 assistants. *Children's Clinic:* 1 assistant.	2 clerks of inspection office, 1 first-class mechanician.	35,720 0	146,285 0	182,005 0	239,316 0	421,321 0
Eye Clinic.	3 assistants.		5,000 0	15,861 0	20,861 0	34,764 0	55,625 0
Psychiatrical Clinic with Reception Department and Out-patients' Department for Nervous and Mental Diseases.	1 assistant, 1 voluntary assistant.		2,100 0	9,740 0	11,840 0	8,400 0	20,240 0
Institute for Forensic Medicine.				2,350 0	2,350 0		2,350 0
* Out-patients' Department for Diseases of the Ear.				4,300 0	4,300 0		4,300 0
* Dental Institute.				2,100 0	2,100 0		2,100 0
Total			66,410 0	215,535 0	281,945 0	282,480 0	564,425 0
† Salaries of the professors in the Medical Faculty.	11 ordinary, 6 extraordinary, and district superintendent.		78,940 0		78,940 0		78,940 0
Sum total			145,350 0	215,535 0	360,885 0	282,480 0	643,365 0

Number of matriculated medical students according to the average of the summer and winter sessions, 1910 277
Total expenditure for the year on one medical student .... 2322 M.
Out of state funds .... 1302 M.

8. Marburg University.

Anatomical Institute.	1 prosector, 2 assistants.	2 servants.	8,680 0	14,041 0	22,721 0		22,721 0
Physiological Institute.	1 district superintendent, 2 assistants.	2 servants.	6,480 0	8,819 0	15,299 0	188 0	15,487 0
Pathological Institute.	2 assistants.	1 servant.	4,740 0	6,823 0	11,563 0		11,563 0
Carried forward			19,900 0	29,683 0	49,583 0	188 0	49,771 0

* Subvention.

† Average salary of the professors is as at Königsberg. The salaries of the ordinary professors vary from 3000 to 6600 M., and those of the extraordinary professors from 1500 to 3000 M.

8. MARBURG UNIVERSITY [*continued*].

INSTITUTE.	Number and Designation of the		State Contributions to the Institute for the following purposes:			Private Income of the Institute.	*Total of estimated Income and Expenditure of the Institute (columns 6 and 7).*
	Scientific Offices (in addition to the Director).	*Other Offices.*	*Personal Expenses.*	*Equipment Expenses.*	*Total of columns 4 and 5.*		
1.	2.	3.	4.	5.	6.	7.	8.
			M. Pf.	M. Pf.	M. Pf.	M. Pf.	M. Pf.
Brought forward			19,900 0	29,683 0	49,583 0	188 0	49,771 0
Pharmacological Institute.	1 assistant.	1 servant.	3,240 0	4,105 0	7,345 0		7,345 0
Institute for Hygiene and experimental Therapeutics.	3 district superintendents, 2 assistants.	1 secretary, 4 servants.	17,380 0	18,583 0	35,963 0		35,963 0
Medical Clinic.	1 head physician, 5 assistants.	1 inspector, 1 porter, 1 servant.	17,000 0	48,745 70	65,745 70	75,263 30	141,009 0
Surgical Clinic.	1 head surgeon, 4 assistants.	1 inspector.	11,620 0	49,344 80	60,964 80	75,655 20	136,620 0
Women's Clinic.	1 obstetrician, 4 assistants.	1 caretaker.	9,490 0	50,517 0	60,007 0	36,082 0	96,089 0
Eye Clinic.	3 assistants.	1 caretaker.	8,370 0	15,347 0	23,717 0	17,913 0	41,630 0
Clinical laundry.				14,987 0	14,987 0		14,987 0
Instruction in Forensic Medicine.				900 0	900 0		900 0
* Out-patients' Department for Ear, Throat, and Neck Diseases.				4,300 0	4,300 0		4,300 0
Dental Clinic.				3,600 0	3,600 0	2,100 0	5,700 0
Total			87,000 0	240,112 50	327,112 50	207,201 50	534,314 0
† Salaries of the professors in the Medical Faculty.	12 ordinary, 9 extraordinary, and district superintendent.		104,200 0		104,200 0		104,200 0
Sum total			191,200 0	240,112 50	431,312 50	207,201 50	638,514 0

Number of matriculated medical students according to the average of the summer and winter sessions, 1910 383
Total expenditure for the year on one medical student .... 1667 M.
Out of state funds .... 1126 M.

9. BONN UNIVERSITY.

Anatomical Institute.	1 district superintendent, 1 prosector, 2 assistants.	1 preparator, 2 servants.	11,170 0	16,500 0	27,670 0		27,670 0
Physiological Institute.	3 assistants, 1 amanuensis.	2 servants.	8,210 0	8,580 0	16,790 0		16,790 0
Pathological Institute.	2 assistants.	2 servants.	6,120 0	7,965 0	14,085 0		14,085 0
Pharmacological Institute.	1 assistant.	1 servant.	3,560 0	4,000 0	7,560 0		7,560 0
Hygienic Institute.	1 assistant.	1 servant.	3,960 0	5,250 0	9,210 0	950 0	10,160 0
Clinical Institutes (comprising the Medical Clinic, the Clinic for Skin Diseases, the Surgical Clinic, and the Women's Clinic).	*Medical Clinic:* 1 head physician, 6 assistants. *Skin Clinic:* 4 assistants.	2 clerks of inspection office, 2 assistant clerks, 1 machinist, 5 servants.	61,940 0	183,521 0	245,461 0	332,819 0	578,280 0
Carried forward			94,960 0	225,816 0	320,776 0	333,769 0	654,545 0

* Subvention.

† The average salary of the professors is as at Königsberg. The salaries of the ordinary professors vary from 4200 to 7500 M., and those of the extraordinary professors from 2600 to 4800 M.

9. Bonn University [*continued*].

INSTITUTE.	Number and Designation of the		State Contributions to the Institute for the following purposes:			Private Income of the Institute.	Total of estimated Income and Expenditure of the Institute (columns 6 and 7).
	Scientific Offices (in addition to the Director).	*Other Offices.*	*Personal Expenses.*	*Equipment Expenses.*	*Total of columns 4 and 5.*		
1.	2.	3.	4.	5.	6.	7.	8.
			M. Pf.	M. Pf.	M. Pf.	M. Pf.	M. Pf.
Brought forward			94,960 0	225,816 0	320,776 0	333,769 0	654,545 0
	Surgical Clinic: 1 head surgeon, 5 assistants.						
	Women's Clinic: 1 head doctor, 3 assistants.						
Eye Clinic.	3 assistants.	1 caretaker.	6,540 0	9.970 0	16.510 0	37.230 0	53.740 0
Psychiatrical Clinic with Reception Department and Out-patients' Department for Mental and Nervous Diseases.	1 assistant.		2,100 0	6,400 0	8,500 0	16,170 0	24,670 0
Instruction in Forensic Medicine.				900 0	900 0		900 0
* Out-patients' Department for Ear, Throat, and Nose Diseases.				6,500 0	6,500 0		6,500 0
* Dental Institute.				2,100 0	2,100 0		2,100 0
Total			103.600 0	251,686 0	355.286 0	387,169 0	742.455 0
† Salaries of the professors in the Medical Faculty.	11 ordinary, 7 extraordinary, and district superintendent.		103,060 0		103,060 0		103.060 0
Sum total			206,660 0	251,686 0	458,346 0	387.169 0	845,515 0

Number of matriculated medical students according to the average of the summer and winter sessions, 1910 496
Total expenditure for the year on one medical student....................1704 M.
Out of state funds....................924 M.

10. Münster University.

Prefatory Note. By agreement with the town of Münster, the instruction in the Philosophical Faculty of the University is so organized that medical students can take all the subjects of their course in that Faculty up to the first medical examination. There is no Faculty of Medicine as such. There is an ordinary professor of Anatomy and one of Physiology in the Philosophical Faculty; there is also an Anatomical and a Physiological Institute, for which the town of Münster has provided suitable accommodation. The city bears the cost of the upkeep of these buildings and the household expenses including domestic service. The state assumes all expenditure for scientific purposes, both on the staff and materials.

Anatomical Institute.	2 assistants.	1 preparator.	5,640 0	7,000 0	12,640 0		12,640 0
Physiological Institute.	1 assistant.		1,500 0	3.500 0	5,000 0		5,000 0
Total			7,140 0	10,500 0	17,640 0		17,640 0
‡ Salaries of the professors.	2 ordinary.		10,500 0		10,500 0		10,500 0
Sum total			17,640 0	10,500 0	28,140 0		28.140 0

Number of matriculated medical students according to the average of the summer and winter sessions, 1910 206
Total expenditure for the year on one medical student....................136 M.
Out of state funds....................136 M.

* Subvention.

† Average salary of the professors is as at Königsberg. The salaries of the ordinary professors vary from 2600 to [illegible] M. and those of the extraordinary professors from 2600 to 4800 M.

‡ Average salary of the professors is as at Königsberg.

EXPLANATIONS.

1. Salaries of scientific and other offices:

Scientific offices:

Professors and district superintendents. *See* remarks under each University.

Head physicians and surgeons and prosectors, 2200 M.

Assistants, 1500 M.

Intermediate offices:

Inspecting officers (controllers, superintendents, secretaries, clerks and cashiers, &c.), 2100 to 4500 M. as maximum salaries attained in 21 years by annual increment; additional allowance for a house when an official residence is not provided.

Departmental offices of the Charité Hospital, 1800 to 4200 M. as maximum salaries attained in 21 years by annual increment; official residence according to position.

Assistant clerks, 1650 to 2300 M. as maximum salaries attained in 21 years by annual increment; official residence according to position.

Under offices:

Preparators, 1650 to 2300 M. as maximum salaries attained in 15 years by annual increment; official residence according to position.

Caretakers in the University Women's Hospitals at Greifswald and Marburg, and the machinist at the Charité Hospital at Berlin, 1400 to 2000 M. as maximum salaries attained in 12 years by annual increment; official residence according to position.

Mechanical engineers in the University institutes, sacristan, and gardener at the Charité Hospital, 1400 to 2000 M. as maximum salaries attained in 21 years by annual increment; official residence according to position.

Servants, caretakers, porters, &c., 1200 to 1700 M. as maximum salaries attained in 21 years; official residence according to position.

2. Institutes receiving subvention are those in which the Governing Body of the Institute provides the accommodation and meets the total cost of management, towards which the state makes only a fixed contribution.

SUMMARY OF GRANTS MADE FOR MEDICAL UNIVERSITY INSTITUTES 1887–1911. EXTRAORDINARY BUDGET.

1. KÖNIGSBERG UNIVERSITY.

INSTITUTE.	Grants in the Financial Years 1887–1911 for				
	Purchase of Land.	*Buildings and Fittings.*	*Instruments and Apparatus.*	*Deficits.*	*Total.*
	M.	M.	M.	M.	M.
Anatomical Institute	52,500	153,100	14,500	15,000	235,100
Pathological Institute		120,140	9,515	2,000	131,655
Hygienic Institute		138,000	9,000	2,090	149,090
Pharmacological Institute		120,145	19,485		139,630
Physiological Institute		44,800			44,800
Medical Clinic	73,500	474,800		9,169	557,469
Surgical Clinic		198,400	106,800	80,900	386,100
Women's Clinic		141,600	13,900	71,345	226,845
Eye Clinic		320,830	10,000	45,110	375,940
Ear Clinic		119,500	10,000		129,500
Clinic for the Insane	120,000	300,000	6,500		426,500
Institute for Forensic Medicine		6,950			6,950
Dental Institute			1,000		1,000
Total	246,000	2,138,265	200,700	225,614	2,810,579

2. BERLIN UNIVERSITY AND THE CHARITÉ HOSPITAL.

Anatomical Institute		633,110	15,000	18,300	666,410
Anatomical-biological Institute		352,800	31,000		383,800
Hygienic Institute		722,900	40,000	19,670	782,570
Carried forward		1,708,810	86,000	37,970	1,832,780

2. Berlin University and the Charité Hospital [*continued*].

Institute.	Grants in the Financial Years 1887–1911 for				
	Purchase of Land.	*Buildings and Fittings.*	*Instruments and Apparatus.*	*Deficits.*	*Total.*
	M.	M.	M.	M.	M.
Brought forward		1,708.810	86.000	37.970	1,832.780
Pathological Institute		1,309,600	54,400	4,600	1,368,600
Pharmacological Institute		25,700	14,000		39,700
Physiological Institute		88,000	64,500	25,800	178,300
Out-patients' Department for Internal Medicine		1,018,800	21,000	22,800	1,062,600
Hydrotherapeutic Institute			4,450		4,450
Out-patients' Department for Pulmonary Diseases				12,000	12,000
Royal Hospital (Control Department)	17,930	418,550		96,800	533,280
In the Royal Hospital:					
Surgical Clinic and Out-patients' Department	300,000	518,000	27,000	364,500	1,209,500
Eye Clinic and Out-patients' Department		5,700			5,700
Ear Clinic and Out-patients' Department		14,300		1,800	16,100
Institute for Orthopedical Surgery			2,400		2,400
University Women's Clinic		335,970	19,000	55,890	410,860
Out-patients' Department for Throat and Nose Diseases				1,500	1,500
Dental Institute	439,480	560,000	22,500	31,700	1,053,680
Institute for Röntgen Ray Investigations		12,850			12,850
Charité Hospital (General)	300,000	2,084,025		2,553,470	4,937,495
I. Medical Clinic		2,018,550	45,000		2,063,550
II. Medical Clinic			147,500		147,500
Institute for Cancer Research		53,000		188,000	241,000
Surgical Clinic and Out-patients' Department of the Charité Hospital		1,219,700	40,000	10,000	1,269,700
Clinic for Psychiatrical and Nervous Diseases		1,501,300	18,000		1,519,300
Women's Clinic of the Charité		426,300		21,500	447,800
Clinic and Out-patients' Department for the Diseases of Children		587,200	15,000	2,000	604,200
Clinic for Skin Diseases		555,600	90,000	53,000	698,600
Eye Clinic and Out-patients' Department of the Charité			5,000		5,000
Clinic for Throat and Nose Diseases		243,900	11,900		255,800
Clinic and Out-patients' Department for Diseases of the Ear		548,800	42,000		590,800
Out-patients' Medical Department of the Charité				4,500	4,500
Total	1,057,410	15,254,655	729,650	3,487,830	20,529,545

3. Greifswald University.

Anatomical Institute		116,400	21,500	4,000	141,900
Pathological Institute		17,600	3,000	2,000	22,600
Hygienic Institute			14,000	16,000	30,000
Pharmacological Institute		73,900			73,900
Physiological Institute		71,950	16,000		87,950
University Hospital (both Medical and Surgical Clinics)	215,150	455,090	2,300	45,400	717,940
Medical Clinic		56,950	36,000		92,950
Surgical Clinic		787,273	22,000		809,273
Women's Clinic		386,570	9,000	66,680	462,250
Eye Clinic		83,700	3,000	15,635	102,335
Out-patients' Department for Skin Diseases			5,000		5,000
Children's Clinic		7,000	3,000		10,000
Clinic for Psychiatrical and Nervous Diseases		722,800	15,500	26,890	765,190
Dental Institute			4,000		4,000
Total	215,150	2,779,233	154,300	176,605	3,325,288

4. Breslau University.

Anatomical Institute		651,100	19,800	4,300	675,200
Pathological Institute		262,500	14,500	8,480	285,480
Hygienic Institute		180,000	20,200	22,500	222,700
Pharmacological Institute		161,200	8,000	2,700	171,900
Physiological Institute		299,200	15,000		314,200
Clinical Institutes (Control Department)	190,000	593,040	4,500	239,950	1,027,490
Medical Clinic	37,200	725,280	21,000		783,480
Carried forward	227,200	2,872,320	103,000	277,930	3,480,450

4. Breslau University [*continued*].

INSTITUTE.	Grants in the Financial Years 1887–1911 for				
	Purchase of Land.	*Buildings and Fittings.*	*Instruments and Apparatus.*	*Deficits.*	*Total.*
	M.	M.	M.	M.	M.
Brought forward	227,200	2,872,320	103,000	277,930	3,480,450
Surgical Clinic		798,800			798,800
Women's Clinic		512,750	16,700		529,450
Eye Clinic		258,000		14,000	272,000
Ear Clinic connected with Out-patients' Department		175,200	10,000		185,200
Clinic for Skin Diseases		419,850	15,900	40,000	475,750
Children's Clinic		248,000	5,800	10,665	264,465
Clinic for Psychiatrical and Nervous Diseases	150,000	862,650	12,000	6,410	1,031,060
Institute for Forensic Medicine		17,850			17,850
Dental Institute		13,000	8,000	2,670	23,670
Total	377,200	6,178,420	171,400	351,675	7,078,695

5. Halle University.

Anatomical Institute		32,000	8,000		40,000
Pathological Institute		52,000			52,000
Hygienic Institute		32,600	21,500		54,100
Pharmacological Institute		57,800	14,000		71,800
Physiological Institute		2,600			2,600
Clinical Institutes (Control Department)		282,660	33,000	90,100	405,760
Medical Clinic		246,050	28,500		274,550
Surgical Clinic		113,460			113,460
Women's Clinic		279,400	12,990	9,150	301,540
Eye Clinic			5,000		5,000
Ear Clinic		55,200			55,200
Clinic for Skin Diseases			7,000		7,000
Clinic for Psychiatrical and Nervous Diseases	296,512	915,530	14,100	16,170	1,242,312
Dental Institute			1,000		1,000
Total	296,512	2,069,300	145,090	115,420	2,626,322

6. Kiel University.

Anatomical Institute		172,050	5,000		177,050
Pathological Institute		507,700	10,400	1,790	519,890
Hygienic Institute		151,350	17,000		168,350
Pharmacological Institute		43,300	12,000		55,300
Physiological Institute		23,900			23,900
Academical Medical Institutions (Control Department)	172,500	228,500		342,900	743,900
Medical Clinic	75,000	273,700	18,000		366,700
Surgical Clinic	97,300	834,870	25,000		957,170
Women's Clinic		421,260	7,000		428,260
Eye Clinic		378,400	10,000		388,400
Out-patients' Department for Diseases of the Ear			1,070		1,070
Clinic for Diseases of the Skin	96,000	79,200	10,000		185,200
Children's Out-patients' Department			5,000		5,000
Clinic for Psychiatrical and Nervous Diseases	134,000	1,116,000	14,000	35,770	1,299,770
Institute for Forensic Medicine			5,000		5,000
Dental Institute			1,000		1,000
Total	574,800	4,230,230	140,470	380,460	5,325,960

7. Göttingen University.

Anatomical Institute		242,600	21,000	3,000	266,600
Pathological Institute		217,500	11,200		228,700
Hygienic Institute		25,000	10,000		35,000
Pharmacological Institute		15,000	11,000	1,500	27,500
Physiological Institute		3,330	23,000		26,330
United University Clinics (Control Department)		393,150		324,510	717,000
Medical Clinic		703,550	11,850		715,400
Carried forward		1,600,130	88,050	329,010	2,017,190

7. Göttingen University [*continued*].

INSTITUTE.	Grants in the Financial Years 1887–1911 for: *Purchase of Land.*	*Buildings and Fittings.*	*Instruments and Apparatus.*	*Deficits.*	*Total.*
	M.	M.	M.	M.	M.
Brought forward		1,600,130	88,050	329,010	2,017,190
Surgical Clinic		541,000			541,000
Women's Clinic		588,950		6,000	594,950
Eye Clinic		373,190	5,100	9,580	387,870
Out-patients' Department for Diseases of the Ear		15,500			15,500
Psychiatrical Clinic with Reception Department and Out-patients' Department for Mental and Nervous Diseases		49,050	2,000		51,050
Institute for Forensic Medicine		20,000			20,000
Dental Institute			1,000		1,000
Total		3,187,820	96,150	344,590	3,628,560

8. Marburg University.

Anatomical Institute		620,000	6,000	4,000	630,000
Pathological Institute		146,880			146,880
Hygienic Institute		30,050	57,800	71,900	159,750
Pharmacological Institute		34,350	9,000		43,350
Physiological Institute		128,730	3,000		131,730
Clinical Institutes (Control Department)	33,776	81,050			114,826
Medical Clinic and Out-patients' Department		151,450	13,300	63,656	228,406
Surgical Clinic and Out-patients' Department		918,300	10,000	76,500	1,004,800
Women's Clinic		295,030		35,200	330,230
Eye Clinic		39,500		13,850	53,350
Out-patients' Department for Diseases of the Ear		18,500			18,500
Psychiatrical Reception Department and Out-patients' Department	41,940				41,940
Dental Institute		9,500	6,000		15,500
Total	75,716	2,473,340	105,100	265,106	2,919,262

9. Bonn University.

Anatomical Institute		170,000	26,000	8,500	204,500
Pathological Institute		44,100	15,000		59,100
Hygienic Institute		32,960	22,200	9,124	64,284
Pharmacological Institute		44,800	2,500		47,300
Physiological Institute		64,900	46,000	18,785	129,685
Clinical Institutes (Control Department)	14,500	358,300		85,110	457,910
Medical Clinic		321,900	22,250		344,150
Surgical Clinic		495,630	14,500		510,130
Women's Clinic		144,885	3,500		148,385
Eye Clinic		351,270			351,270
Out-patients' Department for Diseases of the Ear		5,000			5,000
Clinic for Diseases of the Skin		129,500	25,000		154,500
Psychiatrical Clinic with Reception Departments and Out-patients' Department for Mental and Nervous Diseases		169,220	25,500		194,720
Dental Institute			1,000		1,000
Total	14,500	2,332,465	203,450	121,519	2,671,934

10. Münster University.

Anatomical Institute			3,000	31,460	34,460
Physiological Institute			8,000	2,000	10,000
Total			11,000	33,460	44,460

General Grants for Medical University Institutes (Financial Years 1887–1911).

	M.
Contributions for Röntgen ray investigations	98,000
For instruments and apparatus of Out-patients' Departments receiving subvention	16,000
For instruments and apparatus for Instruction in Forensic Medicine	58,000
For mechanical medical instruments and apparatus	15,000
For the supply of instruments and apparatus for Dental Instruction	61,000
For supplementing the provision of the apparatus of non-clinical medical University Institutes	40,000
For the provision of the apparatus of University Clinics and Out-patients' Departments	220,000
Total	508,000

CLASSIFICATION OF THE EXPENSES NECESSARY FOR THE STUDY OF MEDICINE IN THE BAVARIAN UNIVERSITIES ACCORDING TO THE ESTIMATES FOR THE YEAR 1910–1911.

UNIVERSITY.	*Expenses for the Teaching Staff.*	Expenses for Medical Institutes.		*Remarks.*
		Institute.	*Amount.*	
	M. Pf.		M. Pf.	
München	157,814 41	Anatomical Institute	79,143 91	
		Eye Clinic	60,039 96	
		Surgical Clinic	38,040 0	
		II. Gynæcological Clinic	4,800 0	
		Institute for Histological Embryology	20,510 0	
		Hygienic Institute	29,593 77	
		Institute for Forensic Medicine	6,100 0	
		Medical Clinical Institute	44,371 33	
		I. Medical Clinic	11,927 50	
		II. Medical Clinic	13,227 50	
		Otiatrical Clinic	8,100 0	
		Pathological Institute	29,913 44	
		Pharmacological Institute	15,506 67	
		Physiological Institute	8,858 36	
		Psychiatrical Clinic	98,608 50	
		Out-patients' Departments	88,869 40	
		Clinic for Venereal Diseases	2,768 0	
		Dental Institute	63,200 0	
		Diagrams of Remarkable Cases	1,000 0	
		Hospital	966 0	
		Women's Clinic	67,232 76	
		Children's Clinic	46,405 0	
		Anatomical Institute-General Konservatorium	14,218 25	In Anatomy and the Physiological Institute in München, one part of the allowance is provided for in the estimates of the University and another part in the estimates of the General Konservatorium.
		Physiological Institute - General Konservatorium	12,772 0	
		Total	766,172 35	
Würzburg	128,507 0	Anatomical Institute	36,336 50	
		Hygienic Institute	12,800 0	
		Pathological Institute	35,263 33	
		Pharmacological Institute	9,200 0	
		Physiological Institute	14,588 0	
		Demonstrations in Forensic Medicine	80 0	
		Eye Clinic	51,274 50	
		Surgical Clinic	36,810 50	
		Women's Clinic	97,550 0	
		Medical Clinic	16,405 0	
		Clinic for Skin Diseases	14,975 0	
		Out-patients' Department for Otiatrical Diseases	11,680 0	
		Out-patients' Department with Children's Clinic	10,595 67	
		Psychiatrical Clinic	60,656 0	
		Rhino-laryngological Clinic	8,510 0	
		Dental Institute	9,299 33	
		Total	426,023 83	

UNIVERSITY.	*Expenses for the Teaching Staff.*	Expenses for Medical Institutes.		*Remarks.*
		Institute.	*Amount.*	
	M. Pf.		M. Pf.	
Erlangen....	95,119 16	Anatomical Institute....................................	19,904 0	
		Ear Clinic..	62,662 66	
		Women's Clinic..	81,989 17	
		Hygienic and Bacteriological Institute...........	8,983 33	
		Children's Clinic..	32,970 0	
		Hospital...	137,063 66	
		Ear Clinic...	7,600 0	
		Pathological Anatomical Institute..................	18,112 0	
		Pharmacological Institute.............................	16,776 0	
		Physiological Institute..................................	14,377 0	
		Psychiatrical Clinic	8,533 33	
		Dental Institute..	9,750 33	
		Total......................	418,721 48	
Summary:				
München............	157,814 41	....	766,172 35	
Würzburg...........	128,507 0	....	426,023 83	
Erlangen............	95,119 16	....	418,721 48	
Total.........	381,440 57	....	1,610,917 66	
			381,440 57	
		Sum total..................................	1,992,358 23	

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