Nearly half the second volume is devoted to the Glyptodontidæ. The author rejects the various subdivisions of this family suggested by Ameghino and adopted by Zittel, and refers all the species to six genera, some seventeen other generic terms being regarded as synonymous.

In this group the earlier forms are of comparatively small size, and it is only in the later (Pleistocene) deposits that such giants as *Glyptodon clavipes* and *Dædicurus clavicaudatus* are found. The same progressive increase in bulk is noticeable in other groups, *e.g.* in the Mylodonts and in the Litopterna among the Ungulates. It is not improbable that the great size of the Pleistocene species had much to do with their rapid extermination when some change in the environment took place.

The remainder of the memoir deals with the Dasypodidæ and Megatheriidæ; the latter family being given a somewhat wider scope than usual. The most interesting of the genera described is Eucholœcops, which is probably ancestral to the Mylodonts and in some respects approaches Myrmecophaga.

These memoirs are illustrated by more than a hundred magnificent photographic plates, undoubtedly among the finest of their kind yet published; and while lithographic drawings by a competent artist are to be preferred for the representation of detail, such figures as those of the skeletons of Toxodon and of many of the Glyptodonts will not easily be surpassed.

The text is printed in English and Spanish in parallel columns; the English portion is unfortunately disfigured by very numerous misprints, doubtless owing to the fact that the author was compelled to entrust the correction of the proof-sheets to some person unfamiliar with the language.

THE EVOLUTION OF MODERN SCIENTIFIC LABORATORIES.[1]

THE scientific discoveries of the present century have had such a profound influence upon inventions, upon industries, and upon the comfort, health, and welfare of the people in general, that there is widespread, even if not always adequate, appreciation of the value of scientific study and investigation. But it may be doubted whether there is any proper understanding, in the minds even of the educated public, of the material circumstances which surround scientific discovery and which make it possible. The average man, if interested at all, is interested that the discovery is made, not how it is made.

In America, where men of science rely mainly upon enlightened private beneficence, and not upon governmental aid, to furnish the pecuniary resources which are essential for scientific progress, it is important that there should be some general information not only regarding the results of scientific work, but also regarding the external material conditions necessary for the fruitful prosecution of such work.

At the present day the systematic study and advancement of any physical or natural science, including the medical sciences, requires trained workers who can give their time to the work, suitably constructed work-rooms, an equipment with all of the instruments and appliances needed for the special work, a supply of the material to be studied, and ready access to the more important books and journals containing the special literature of the science.

All of these conditions are supplied by a well-equipped and properly organised modern laboratory. Such laboratories are, with the partial exception of the anatomical laboratory, entirely the creation of the present century, and for the most part of the last fifty years. They have completely revolutionised during the past half-century the material conditions under which scientific work is prosecuted. They are partly the result, and in larger part the cause, of that rapid progress of the physical and natural sciences which characterises the era in which we are living.

The evolution of the modern laboratory still awaits its historian. It is not difficult to find incidental references to historical facts bearing upon this subject. The development of the chemical laboratory has been traced with some fulness. But it is curious that there is no satisfactory monographic treatment of the general subject of the historical development of scientific laboratories. The subject seems to me an attractive one. It would surely be interesting to trace the development of the teaching and the investigating laboratory back to its beginnings, to learn about the material circumstances under which the physicists, the chemists, the morphologists, and physiologists of former generations worked. What share in the development of laboratories had the learned academies of the Renaissance and of the subsequent centuries? What share had public and private museums and collections of instruments of precision? What share had the work of the exact experimentalists, beginning with Galileo, of physicians, of the alchemists, and of the apothecaries? What individuals, universities, corporations, and governments were the pioneers in the establishment of laboratories for the various physical and natural sciences? The detailed consideration of these and many other questions pertinent to the subject would make an interesting and valuable historical contribution.

There is evidence that in Alexandria, under the early Ptolemies in the third century before Christ, there existed State-supported institutes, in which students of man and of nature could come into direct personal contact with the objects of study, and by the aid of such appliances as were then available could carry on scientific investigations. The practical study of anatomy, physiology, pathology, and other natural sciences was here cultivated. We are very imperfectly informed as to the results and the material circumstances of this remarkable period in the history of science. We know that after about a century of healthy activity the Alexandrian school gradually sank into a place for metaphysical discussions.

Fifteen hundred years elapsed before we next find any record of the practical study of a natural science. In 1231, the great Hohenstaufen, Frederick the Second, who has been called the most remarkable historic figure of the Middle Ages, commanded the teachers at Salernum diligently to cultivate the practical study of anatomy. After the passage of this edict occasional dissections of the human body were made, but it cannot be said that there was any diligent cultivation of anatomy on the part either of teachers or of students during the following two centuries.

In the latter half of the fifteenth century there developed that active interest in the practical study of human anatomy which culminated in the immortal work of Vesalius, published in 1543. After this the study of anatomy by dissections gradually assumed in the medical curriculum that commanding position which it has maintained up to the present day.

For over six hundred years there has been at least some practical instruction in anatomy, and for over three hundred years there have existed anatomical laboratories for purposes of teaching and of investigation, although only those constructed during the present century meet our ideas of what an anatomical laboratory should be. It is a matter of no little interest, both for the history of medicine and for that of science in general, that the first scientific laboratory was the anatomical laboratory. Private laboratories for investigation must have existed from the earliest times. Doubtless Aristotle had his laboratory. But the kind of laboratory which we have on this occasion in mind is one open to students or investigators, or both. There was no branch of physical or natural science, with the exception of anatomy, which students could study in the laboratory until after the first quarter of the present century. Only in anatomy could students come into direct contact with the object of study and work with their own hands and investigate what lay below the surface.

The famous Moravian writer on education, Amos Comenius, over two hundred and fifty years ago, gave vigorous expression to the conception of living, objective teaching of the sciences. He said, "Men must be instructed in wisdom so far as possible, not from books, but from the heavens, the earth, the oaks and the beeches—that is, they must learn and investigate the things themselves, and not merely the observations and testimonies of other persons concerning the things." "Who is there," he cries, "who teaches physics by observation and experiment instead of by reading an Aristotelian or other text-book?" But how little ripe were the conditions then existing for the successful carrying out of ideas so far in advance of his times is illustrated by the very writings of the author of "Orbis Pictus" and "Lux in Tenebris."

It would lead too far afield to trace in detail on this occasion the development of physical and of chemical laboratories, but on account of the intimate connection between the development of physics and chemistry and that of medicine, especially of more

[1] An address delivered at the opening of the William Pepper Laboratory of Clinical Medicine, Philadelphia, December 4, 1895, by Prof. William H. Welch.

exact experimental work in the medical sciences, a few words on this subject will not be out of place.

Methodical experimentation in the sciences of nature was definitely established by Galileo, and was zealously practised by his contemporaries and successors in the seventeenth century. It was greatly promoted by the foundation during this century of learned societies, such as the Accademia dei Lincei and the Accademia del Cimento in Italy, the Collegium Curiosum in Germany, the Académie des Sciences in Paris, and the Royal Society in England. Much of the classical apparatus still employed in physical experiments was invented at this period. Experimental physics from the first acquired a kind of fashionable vogue, and this aristocratic position it has ever since maintained among the experimental sciences. These sciences must concede to physics that commanding position which it has won by the genius of the great natural philosophers, by the precision of its methods and the mathematical accuracy of its conclusions, and by the fundamental nature and profound interest and importance of its problems. The debt of the medical sciences to the great experimental physicists, from Kepler and Galileo and Newton down to Helmholtz, is a very large one, larger than is probably appreciated by medical men who have not interested themselves in the history of experimental and precise methods in medicine.

There existed in the last century cabinets of physical apparatus to be used in demonstrative lectures, but they were very inadequate, and suitable rooms for experimental work scarcely existed. It was not until about the middle of the present century that we find the beginnings of the modern physical laboratory. Lord Kelvin, then William Thomson, established a physical laboratory in the University of Glasgow about 1845 in an old wine-cellar of a house. He tells us that "this, with the bins swept away, and a water supply and sink added, served as a physical laboratory for several years." It was as late as 1863 that Magnus opened in Berlin his laboratory for experimental physical research. Since 1870 there has been a rapid development of those splendid physical institutes which are the pride of many universities.

Humbler but more picturesque was the origin of the chemical laboratory. This was the laboratory of the alchemist searching for the philosopher's stone. In the painter's canvas we can still see the vaulted, cobwebbed room with its dim and mysterious light, the stuffed serpent, the shelves with their many-coloured bottles, the furnace in the corner with the fire glowing through the loose bricks, the fantastic alembics, the old alchemist in his quaint arm-chair reading a huge, worm-eaten folio, and the assistant grinding at the mortar. Fantastic and futile as it all may seem, yet here was the birth of modern chemistry. The alchemists were the first to undertake the methodical experimental investigation of the chemical nature of substances. No more powerful stimulus than the idea of the philosopher's stone could have been devised to impel men to ardent investigation. But search for gold was not all that inspired the later alchemists Paracelsus, the alchemist, that strange but true prophet of modern medicine as he was of modern chemistry, said, "Away with these false disciples who hold that this divine science, which they dishonour and prostitute, has no other end but that of making gold and silver. True alchemy has but one aim and object, to extract the quintessence of things, and to prepare arcana, tinctures, and elixirs which may restore to man the health and soundness he has lost." And again he says of the alchemists, "They are not given to idleness nor go in a proud habit or plush or velvet garments, often showing their rings upon their fingers, or wearing swords with silver hilts by their sides, or fine and gay gloves upon their hands, but diligently follow their labours, sweating whole days and nights by their furnaces. They do not spend their time abroad for recreation, but take delight in their laboratory. They wear leather garments with a pouch and an apron wherewith to wipe their hands. They put their fingers among coals and into clay, not into gold rings."

During the seventeeth and eighteenth centuries the doctrines and work of the alchemists had profound influence upon medicine. Alchemy was not completely overthrown until Lavoisier gave the death-blow to the phlogistic theory of Stahl. But for a considerable time before Lavoisier introduced the new spirit into chemistry, its methods and its problems were gradually approaching those of modern times. It was, however, over thirty years after the tragic death of Lavoisier before the first chemical laboratory in the modern sense was established. One cannot read without combined feelings of wonder and pity of the incommodious, forlorn, and cramped rooms in which such men as Scheele and Berzelius and Gay-Lussac worked out their memorable discoveries. Liebig has graphically described the difficulties encountered by the student of that day who wished to acquire practical training in chemistry. With some of the apothecaries could be obtained a modicum of practical familiarity with ordinary chemical manipulations, but Sweden and France were the centres for those with higher aspirations.

It was the memory of his own experiences which led Liebig, immediately after he was appointed professor of chemistry in Giessen in 1824, to set about the establishment of a chemical laboratory. Liebig's laboratory, opened to students and investigators in 1825, is generally stated to be the first modern public scientific laboratory. Although, as we shall see presently, this is not quite correct, it is certain that Liebig's laboratory was the one which had the greatest influence upon the subsequent establishment and organisation not only of chemical laboratories, but of public scientific laboratories in general. Its foundation marks an epoch in the history of science and of scientific education. This laboratory proved to be of great import to medical science, for it was here, and by Liebig, that the foundations of modern physiological chemistry were laid.

The significance of this memorable laboratory of Liebig is not that it was a beautiful or commodious or well-equipped laboratory, for it possessed none of these attributes—indeed, it is said to have looked like an old stable—but that here was a place provided with the needed facilities and under competent direction, freely opened to properly prepared students and investigators for experimental work in science.

The chemical laboratories of to-day are, in general, the best organised and the best supported of scientific laboratories.

The need of establishing physiological laboratories was recognised several years before the foundation of Liebig's laboratory. The important results to be derived from the application of the experimental method to the study of vital phenomena had been demonstrated first and most signally by Harvey, and after him by many experimenters. The fecundity of exact experimentation by physical and chemical methods applied to the phenomena of life had been shown by the classical researches of Lavoisier on respiration and animal heat. Magendie had entered upon that remarkable scientific career which entitles him to be regarded as the founder of modern experimental physiology, pathology, and pharmacology.

In 1812, Gruithuisen, who, after the custom of the times, filled an encyclopædic chair, being professor in Munich of physics, chemistry, zootomy, anthropology, and later of astronomy, published an article advocating the establishment of physiological institutes. In 1823, Purkinje, one of the most distinguished physiologists of this century, accepted the professorship of physiology in Breslau, this being the first independent chair of physiology in any German university. In 1824, Purkinje succeeded in establishing a physiological laboratory, which therefore antedates by one year Liebig's chemical laboratory in Giessen, although it cannot be said to have exercised so great an influence upon the organisation of scientific laboratories in general as did the latter. In 1840, Purkinje obtained a separate building for his laboratory.

With two or three exceptions, all of the separate physiological laboratories worthy of the name have been established since the middle of the present century. Bernard, that prince of experimenters, worked in a damp, small cellar, one of those wretched Parisian substitutes for a laboratory which he has called "the tombs of scientific investigators." There can be no greater proof of the genius of Bernard than the fact that he was able to make his marvellous discoveries under such obstacles and with such meagre appliances. France was long in supplying her scientific men with adequate laboratory facilities, but no more unbiassed recognition of the value and significance of the German laboratory system can be found than in the reports of Lorain, in 1868, and of Wurtz, in 1870, based upon personal study of the construction and organisation of German laboratories.

Of modern physiological laboratories, the one which has exerted the greatest and most fruitful influence is unquestionably that of the late Prof. Ludwig in Leipzig. This unequal position it has won by the general plan of its organisation, its admirable equipment, the number and importance of the discoveries there made, its development of exact methods of experimentation, the

personal character and genius of its director, and the number of experimenters there trained from all parts of the civilised world.

To-day every properly equipped medical school has its physiological laboratory. This department is likely to continue to hold its place as the best representative of exact experimental work in any medical science. A good knowledge of physiology is the best corrective of pseudo-scientific, irrational theories and practice in medicine.

Physiological chemistry has been an important department of research for over half a century, but it is only within recent years that there have been established independent laboratories for physiological chemistry. A large part of the work in this branch of science has been done hitherto in laboratories of general chemistry, of physiology, of pathology, and of clinical medicine. A physiological laboratory cannot well be without a chemical department, and the same is true of several other medical laboratories; but it seems to me that physiological chemistry has won its position as an independent science, and will be most fruitfully cultivated by those who with the requisite chemical and biological training devote their entire time to it. The usefulness of independent laboratories for physiological chemistry has been shown by the work done in Hoppe-Seyler's laboratory in Strassburg since its foundation in 1872. This was the first independent laboratory of physiological chemistry.

The first pathological laboratory was established by Virchow, in Berlin, in 1856. About this time he wrote: "As in the seventeenth century anatomical theatres, in the eighteenth clinics, in the first half of the nineteenth physiological institutes, so now the time has come to call into existence pathological institutes, and to make them as accessible as possible to all." It cannot be doubted that the time was fully ripe for this new addition to medical laboratories. Virchow secured his laboratory as a concession from the Prussian Government upon his return from Würzburg to Berlin. Virchow's laboratory has been the model as regards general plan of organisation for nearly all pathological laboratories subsequently constructed in Germany and in other countries. It embraced opportunities for work in pathological anatomy, experimental pathology, and physiological and pathological chemistry. This broad conception of pathology and of the scope of the pathological laboratory as including the study, not only of diseased structure, but also of disordered function, and as employing the methods, not only of observation, but also of experiment, should never be lost sight of.

The first to formulate distinctly the conception of pharmacology as an experimental science distinct from therapeutics and closely allied by its methods of work and by many of its problems to physiology, was Rudolph Buchheim. This he did soon after going to Dorpat in 1846 as extraordinary professor of materia medica, and it was apparently not long after he there became ordinarius in 1849 that he established a pharmacological laboratory in his own house and by his private means. Later, this laboratory became a department of the University, and developed most fruitful activity. Buchheim's laboratory was the first pharmacological laboratory in the present acceptation of this term. The conception of pharmacology advocated by Buchheim has been adopted in all German universities, and in not a few other universities; but it cannot be said to have been as yet generally accepted in the medical schools of this country and of Great Britain, although it seems destined to prevail.

The medical science which was the latest to find domicile in its own independent laboratory is hygiene. To Pettenkofer belongs the credit of first establishing such a laboratory. Since 1847 he had been engaged with hygienic investigations, and in 1872 he secured from the Bavarian Government the concession of a hygienic institute. This admirably equipped laboratory was opened for students and investigators in 1878. By this time Koch had already begun those epochal researches which, added to the discoveries of Pasteur, have introduced a new era in medicine. The introduction by Koch of new methods of investigating infectious diseases and many hygienic problems became the greatest possible stimulus for the foundation of laboratories of hygiene and bacteriology, and to some extent also of laboratories of pathology. The results already achieved by these new methods and discoveries in the direction of prevention and cure of disease, and the expectation of no less important results in the future, constitute to-day our strongest grounds of appeal to governments and hospitals and medical schools and the general public for the establishment and support of laboratories where the nature, the causes, the prevention, and the cure of disease shall be investigated. You have established in Philadelphia, and in connection with the Johns Hopkins University, the first hygienic laboratory in America, housed in its own building and assured, I believe, of a future of great usefulness.

It is apparent, from the brief and imperfect outline which I have presented of the evolution of modern scientific laboratories, that the birthplace of these laboratories, regarded as places freely open for instruction and research in the natural sciences, was Germany. Such laboratories are the glory to-day of German universities, which possess over two hundred of them. By their aid Germany has secured since the middle of the present century the palm for scientific education and discovery.

Great scientific investigators are not limited to any country or any time. There are those of surpassing ability who will make their own opportunity and will triumph over the most discouraging environment. This country and every civilised country can point to such men, but they are most exceptional. The great majority of those even with the capacity for scientific work need encouragement and opportunity. We now have sufficient knowledge of the workings of scientific laboratories to be able to assert that in general where the laboratory facilities are the most ample and the most freely available, there are developed the largest number of trained workers, and there the discoveries are the most numerous and the most important. At the present day no country, no university, and no medical school can hold even a respectable place in the march of education and progress unless it is provided with suitable laboratories for scientific work.

A properly equipped and properly conducted scientific laboratory is a far more expensive institution than is usually conceived. It must be suitably domiciled either in a separate building or in rooms commodious and well-lighted. The outside architectural features are of secondary importance. The instruments and appliances necessary for exact observation and experiment, even in those sciences which apparently require the least, are numerous and costly. A working library, containing the books and sets of journals most frequently consulted, is most desirable, if not absolutely indispensable. The director of the laboratory should be a man of ability and experience, who is a master in his department of science. He must have at least one assistant, who is preferably a young man aiming to follow a scientific career. A person of no small value in the successful working of the laboratory is the intelligent janitor or "diener," who can be trained to do the work of a subsidiary assistant and can be entrusted with the care and manipulation of instruments. There must be funds for the purchase of fresh supplies and new instruments when needed. The running expenses of a first-class laboratory are not small.

But, costly as may seem the establishment and support of a good laboratory, the amount of money expended for laboratories would seem to us ridiculously insignificant if we could estimate the benefits to mankind derived from the work which has been done in them. Wurtz has truly said of the money required for laboratories, "It is a capital placed at a high rate of interest, and the comparatively slight sacrifice imposed upon one generation will bring to following generations increase of well-being and knowledge."

The educational value of the laboratory cannot well be overestimated. For the general student this is to be found primarily in the development of the scientific habit of thought. He learns that to really know about things it is necessary to come into direct contact with them and study them. He finds that only this knowledge is real and living, and not that which comes from mere observation of external appearances, or from reading or being told about things, or, still less, merely thinking about them.

The problem of securing for the student of medicine the full benefits of laboratory instruction in the various medical sciences is a difficult one, and cannot, I believe, be solved without considerable readjustment of existing schemes of medical teaching; but this subject is one which I cannot attempt to consider here.

The whole face of medicine has been changed during the last half-century by the work of the various laboratories devoted to the medical sciences. Anatomy, physiology and pathology now rank among the most important of the sciences of nature. They have been enriched with discoveries of the highest significance and value not only for medicine, but also for general biology. Although we have not penetrated, and perhaps may never penetrate, the mystery of life, we are coming closer and closer to an understanding of the intimate structure and the

fundamental properties of living matter. We already know that living matter is not that homogeneous, formless substance which, not many years ago, it was believed to be, but that it possesses a complex organisation.

Practical medicine has been profoundly influenced by the unparalleled development of the medical sciences during the last fifty years, and especially during more recent years. Scientific methods have passed from the laboratory to the hospital. Cases of disease are now studied with the aid of physical and chemical and microscopical and bacteriological methods. The diagnosis of disease has thereby been greatly advanced in precision, and if Boerhaave's motto, *qui bene diagnoscit, bene medebitur*, be true, there should be a corresponding advance in the results of the treatment of disease. Whether or not this dictum of the old master be true—and I have serious doubts as to its entire truth—it cannot be doubted that great progress has been made in medical, and especially in surgical treatment as a result of scientific discoveries, although the treatment of disease still rests, and will doubtless long continue to rest, largely upon empirical foundations.

We are assembled here to-day to assist at the opening of a laboratory which gives the fittest and strongest possible expression to the influence of scientific work upon practical medicine. The generous founder has marked with characteristic insight the direction in which the current is setting.

The conception of a thoroughly equipped laboratory as an integral part of a hospital and intended for the study and investigation of disease is of recent origin. The germs of this idea, however, may be traced back to such men as Hughes Bennett and Beale in Great Britain, and to Frerichs and Traube in Germany, who in their hospital work made fruitful application of microscopical, chemical, and experimental methods. A little over ten years ago, von Ziemssen, in Munich, established a well-conceived clinical laboratory, containing a chemical, a physical, and a bacteriological department, a working library, and rooms for practical courses and the examination of patients. A similar laboratory was secured by Curschmann in Leipzig in 1892.

The growing recognition of the need of such laboratories is the result of the great progress in scientific medicine during recent years. The thorough clinical examination of many cases of disease now requires familiarity with numerous technical procedures, physical, chemical, microscopical, and bacteriological. The laboratory outfit required simply for routine clinical examinations is considerable. A microscope and a few test tubes and chemical reagents for simple tests of the urine no longer suffice. As illustrations of this, I call attention to the clinical value of examinations of the blood, of the contents of the stomach, of fluids withdrawn from the serous cavities, of the sputum and various secretions, of fragments of tissue removed for diagnosis. Such examinations require much time, trained observers, and considerable apparatus. To secure for the patients the benefits in the way of diagnosis, prognosis, and treatment to be derived from these methods of examination, a hospital should be supplied with the requisite facilities.

A hospital, and especially one connected with a medical school, should serve not only for the treatment of patients, but also for the promotion of knowledge. Where this second function is prominent, there also is the first most efficiently and intelligently carried out. Herein we see the far-reaching beneficence of a laboratory, such as this one, thoroughly equipped to investigate the many problems which relate to clinical medicine.

The usefulness of an investigating laboratory in close connection with a hospital has already been abundantly demonstrated. Chemical studies, more particularly those relating to metabolism in various acute and chronic affections, microscopical and chemical investigations of the blood and bacteriological examinations of material derived directly from the patient, may be mentioned as directions in which researches conducted in hospital laboratories have yielded important results and will garner still richer harvests in the future.

There need be no conflict between the work of clinical laboratories and that of the various other medical laboratories. Each has its own special field, but it is not necessary or desirable to draw around these fields sharp boundary lines beyond which there shall be no poaching. It will be a relief to pathological and other laboratories to have certain examinations and subjects relating directly to practical medicine consigned to the clinical laboratory, where they can receive fuller and more satisfactory consideration. The subject-matter for study in the clinical laboratory is primarily the patient and material derived from the patient. Anatomical, physiological, pathological, pharmacological, and hygienic laboratories must concern themselves with many problems which have apparently no immediate and direct bearing upon practical medicine. In the long run their contributions are likely to prove most beneficial to medicine if broad biological points of view, rather than immediate practical utility, are their guiding stars. The clinical laboratory will concern itself more particularly with questions which bear directly upon the diagnosis and the treatment of disease.

To the small number of existing well-equipped clinical laboratories the William Pepper Laboratory of Clinical Medicine is a most notable addition. It is the first laboratory of the kind provided with its own building and amply equipped for research in this country, and it is not surpassed in these respects by any in foreign countries. It is intended especially for investigation and the training of advanced students. It is a most worthy memorial of the father of its founder.

William Pepper the elder was a very distinguished physician and trusted consultant of Philadelphia, for many years an attending physician at the Pennsylvania Hospital, where he was a clinical teacher of great influence, and for four years the professor of the theory and practice of medicine in this University. He belonged to that remarkable group of American physicians, trained under Louis, who brought to this country the best methods and traditions of the French school of medicine at the time of its highest glory. His diagnostic powers are said to have been remarkable. With his broad sympathies, his lofty ideals, and his active and enlightened efforts for the promotion of clinical medicine, how he would have welcomed such opportunities as will be afforded by this laboratory to contribute to a better knowledge of the nature, the diagnosis, and the treatment of disease!

Our country has until within a very few years been deprived of the encouragement and opportunities for original investigations in the medical sciences afforded by large and thoroughly equipped laboratories. We can still count upon the fingers of one hand our medical laboratories which are comparable in their construction, organisation and appliances to the great European laboratories. Notwithstanding these obstacles, there have been American physicians of whose contributions to medical science we may feel proud.

But a new era has dawned. Of that we are witnesses here to-day. The value of medical laboratories is now widely recognised among us. To those of us who appreciate the underlying currents in medicine, who follow with eager interest the results of the almost feverish activities in foreign laboratories, who recognise the profound interest and importance of the many medical problems which await only patient investigation and suitable facilities for their solution, and who would like to see our country take the prominent position it should in these investigations, our laboratories may seem slow in coming, but they will in time be provided by enlightened benevolence. The individual or institution or hospital which contributes to the establishment of a good laboratory devoted to any of the medical sciences merits in unusual degree the gratitude of all medical men; yes, of every true friend of humanity. Such gratitude we feel for the generous and public-spirited founder of this laboratory, who has contributed largely to the advancement of medicine in this country, and of whose splendid services to this university I need not speak in this presence.

I congratulate this city and this university and this hospital upon the important addition made by this laboratory to higher medical education and the opportunities for scientific work in this country. May the enlightened aims of the founder, and the hopes of all interested in the promotion of medicine in this country, be fulfilled by the scientific activities which will now begin in the William Pepper Laboratory of Clinical Medicine.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—At the Encænia this year (June 24) it will be proposed to confer the honorary degree of D.C.L. upon Sir Archibald Geikie, among others.

The Rolleston memorial prize has been awarded to Mr. Horace M. Vernon, for his dissertations on (1) the effect of environment