possible connection between the practice of business and the academic training which we associate with university education.

The London School of Economics has had, so far, a very successful career. In its temporary home in Adelphi Terrace are found lecture-rooms and class-rooms, in which a staff of over twenty teachers give instruction; also a well-furnished library containing over 10,000 volumes on economic subjects. The growing importance of the study of economic science in its relation to international trade and commerce, and the success of the attempt to establish in London a special high school for the teaching of the subject will be regarded as justifying the University of London Commissioners in recommending the addition of a faculty of economics to the other faculties of the University; and it may reasonably be hoped that the present school will in the near future be greatly developed, and become more closely associated with the new University.

To many persons it seems highly desirable that the economic and commercial faculty of the new University should be located in the Imperial Institute. The well-arranged collections of Indian and Colonial products, which form a most important part of the equipment of that institute, would be found of especial value in illustrating the teaching of that branch of commercial education known as *Waarenkunde*. Nowhere else in London do similar facilities exist for instruction in the technology of commercial products. Within the building, too, has been provided a chemical laboratory, which is now largely used for the examination and analysis of foreign products; and much of the scientific investigation, therein carried on, under the able direction of Prof. Dunstan, is an essential feature in the programme of a high school of commerce. Indeed, a large part of the work which entered into the original scheme of the promoters of the Imperial Institute, might, it would seem, consistently, and with great advantage to the public, be continued in that institute under the auspices of a school of economics, industry and commerce, in connection with the reconstituted University of London. Whether such an arrangement can be effected is a matter for careful consideration; but there is no doubt that the association with the new University of a school of "economics and political science," under a separate faculty, suggests a reasonable basis of union between the educational side of the Imperial Institute and the future University of London.

As a consequence of the proposed recognition of economics and commerce as a separate faculty of the University, the London County Council have offered, under certain conditions, to allocate to its maintenance a yearly sum of 2500*l*., being part of their promised contribution to the funds of the University. By the aid of such an endowment, increased as it probably will be from other sources, the present School of Economics might enter upon a wider sphere of usefulness with new resources and facilities for advanced teaching, and might become a very important part of a teaching university.

It is now generally understood that a modern university must differ in many essential features from the university of former centuries. Such a university must gather up not only the wisdom stored of ages, but the newest knowledge in its application to the industrial requirements of modern life. The indebtedness of pure science to the investigations and experiments of astronomers, physicians and engineers is generally recognised, and shows how inquiries originally undertaken with a view to some practical end have often led to the discovery of new scientific truths. What is true in physical science is found to be the case also in economic science; and the establishment of a school for inquiry into economic and industrial phenomena; the better definition of our existing knowledge of the subject for the purposes of instruction; the organisation of systematic methods of investigation and research; and, above all, the recognition of the teachers, as constituting a separate university faculty, with common aims and objects, will certainly give a new impulse to the study of the laws of productive industry, and will add largely to our knowledge of the conditions under which trades are fostered, and nations are able to compete with one another in the struggle for new markets.

The establishment of a Faculty of "Economics and Political Science (including commerce and industry)" by no means implies the granting by the University of a corresponding degree. A University degree in any faculty is only supposed to indicate that a student has undergone a systematic course of instruction in a certain department of knowledge, and the precise title of the degree is a matter of comparative indifference. It is essential that, in any new university, there should be distinct and separate avenues to a degree, through the study of the special groups of subjects, in which the student elects to receive his training; and it is enough that the degree should certify that he has undergone such a training. There is no necessary connection between a faculty and a degree. In London, a candidate can take the M.B. or B.S. degree in the Faculty of Medicine, and the M.A. or D.Lit. in the Faculty of Arts. In the Faculty of Science, there are already several different paths along which a student may proceed to graduation, and it is a matter of no great moment whether students in the Faculty of Economics should take the B.Sc. degree, or whether a new title should be invented. Indeed, it may be hoped that, both in engineering and in economics, considerable freedom will be given to the recognised teachers of the university, and that different combinations of subjects, provided they involve an equivalent academic training, will be accepted by the Academic Council of the new university for the degree examination.

The existence in London of a high school of commerce in close connection with the reorganised university, will not only give an impetus to the study of subjects bearing directly upon the development of our manufacturing trades and commerce, but will exercise an important influence upon the curriculum of our secondary and higher grade schools. As the "Board of Education Bill" provides, in the first place, for the organisation of the central authority and of the Consultative Committee, and leaves to a later date the constitution of local authorities, so it will be found that, if a commercial school of university rank is successfully established, the first step will be made towards the organisation of a system of commercial education for schools of a lower grade.

The proposal of the Statutory Commissioners to establish a Faculty of Economics and Political Science in connection with the new university, is the opening of a new era for commercial education in this country; and the recommendation will be welcomed, as showing that the Commissioners fully recognise the importance of bringing the new University of London into close relation with the varied educational requirements of the present day.

PHILIP MAGNUS.

WILLIAM RUTHERFORD.

THIS distinguished physiologist was a son of the border. He was born at Ancrum in Roxburghshire in 1839, and he died in Edinburgh on February 21, 1899. About thirty-six years of his busy life, from the date of his graduation in 1863, were spent in the pursuit of physiological science. After studying at Berlin, Vienna, and Paris, he became assistant to the late John Hughes Bennett, who then filled the chair of Physiology in Edinburgh. For many years Bennett had taught histology and the use of the microscope to voluntary classes, and among his pupils may be mentioned the well-known

names of Redfern, Carter, and Dobie, who have each made their mark in this branch of science. It was not, however, until the early sixties that practical physiology, as now understood, was developed in the Edinburgh school. Bennett's great contemporary, John Goodsir, the anatomist, brought under his notice the new experimental school of Germany, and in a short time the ingenious instruments of Helmholtz, Du Bois-Reymond, and Ludwig made their appearance in Edinburgh, probably before they were known in any other school in Great Britain. The first assistant who dealt with such matters, and who added a short course of instruction in physiological chemistry, was Dr. Argyll Robertson, the eminent ophthalmologist. After him came Rutherford, who threw himself into the work with characteristic ardour, and who amplified the course from year to year. In 1869, he became Professor of Physiology in King's College, London; in 1871, Professor of Physiology in the Royal Institution of Great Britain; and, in 1874, he returned to Edinburgh to occupy the chair of his old master. For twenty-five years he laboured unremittingly as a teacher, and he was able, as few men could have done, to cope with the enormous classes which for several years characterised the Edinburgh school. During the winter session, the systematic class frequently numbered five hundred students, while about two hundred and fifty obtained instruction in practical physiology, partly in the winter but mostly in the summer session.

It has always been the tradition that the occupant of a Scottish chair is expected to do two things: he must, in the first place, be a successful teacher, and, in the next, he must contribute to scientific progress; and it may be at once said that many eminent men have not found the two classes of duties to be incompatible. Rutherford is a typical example of such a successful combination, although, no doubt, he will be best remembered as a teacher. In this department of his work he was indeed a master. No one understood better the arts of clear exposition and of successful demonstration. It may be said his lectures were demonstrations from beginning to end. He devised ingenious methods by which fundamental phenomena might be successfully shown to large numbers of students, and his lectures were always copiously illustrated by diagrams. He did not trust much to text-books, nor to students finding out for themselves by laboratory work. He believed that the average student requires to be guided; that he must have the subject placed before him in such a way that he can grasp its leading principles; and that, without careful supervision and almost elementary drill, he will probably lose time in bungling laboratory work. Rutherford, therefore, took immense pains in leading the student on step by step, both in systematic teaching and in the laboratory. It is probable that from the highest point of view he erred in his method, or, rather, carried it too far, but he was eminently successful in training the average man.

Recognising that physiology is a composite science, a science that rests on the triple foundation of anatomy, physics, and chemistry, his own predilections were towards the first. He was thoroughly conversant with histology, as a branch of anatomy, and in his lectures perhaps undue prominence was given to this subject. He spent more time than was necessary in minute morphological details, with the physiological significance of which he was unacquainted; but he held that physiology must begin with an intimate knowledge of the structure of the cell and of the fibre. In this he was right. Histology, for ordinary students, must be taught from the physiological standpoint, but it is high time that the physiologist was relieved from teaching the technique of the subject. Rutherford's earlier training prevented him from grasping with equal firmness the applications of chemistry and physics to physiological problems. Here he was not so much at home. It only remains to be said that, taking him all round, he was one of the most successful teachers that ever adorned the northern school.

As an original investigator, Rutherford accomplished not a little, although it must be admitted that the time he devoted to teaching was often at the expense of that which might have been given to original work. It is also too true that when we sum up a man's work, as a rule it seems insignificant. Even the most skilled and diligent labourers lay only a few stones in the building of the temple. Rutherford did good service to histology by the invention of the freezing microtome, an instrument, however, that has served its day, and, except for special work, must give place to more modern and better methods. In his earlier years he paid much attention to electrophysiology, expounded electrotonus, and discussed various points connected with the excitability of nerve. One of his most important communications was made in 1870, on the influence of the vagus on the circulation. From 1872 to 1879 he laboured much on the physiological action of drugs on the secretion of bile, an investigation originated during Bennett's life-time, and then carried on largely by Rutherford and Dr. Arthur Gamgee. Rutherford, in his later researches, and assisted by a young Frenchman, William Vignal, went over the old ground, and extended its area. He investigated the subject by a most laborious and troublesome method, and no doubt laid solid foundations for our knowledge of the actions of various substances on the formation of bile. This work, owing largely to the unreasonable criticisms of those who objected to observations on animals, was the cause of much annoyance and worry, embittering for a time his social life, while it did not bring to him the credit that subsequent years will show it deserved.

In his later years, Rutherford expounded a theory of muscular contraction that has excited not a little attention, and given rise to much criticism. He was also much interested in the question of the functions of the cochlea in the appreciation of tone, and he advanced the "telephone" theory in opposition to the analytic theory of Helmholtz. Latterly he had grave doubts of the accuracy of Johannes Müller's doctrine of the specific energy of nerves, and had he lived he would probably have written on this subject.

Rutherford was a man of strong personal characteristics. A mannerism impossible to describe, acquired in early manhood, became a second nature, and was at first repellent and liable to be misunderstood. If his criticisms were sometimes severe, his scorn of an opponent scathing and bitter, and his assumption of dignity bordering on the grotesque, those who knew something of the inner life were aware that he did good by stealth, and that behind all the formality there was a simple, kindly nature. Animated by a deep love of science, possessed with a sense of duty that was unsparing in its demands on all his energies, imbued with a love of the beautiful that found its delight in painting and music, a warm friend, a stern and unyielding foe, as if some of the blood of the old borderers lingered in his veins, Rutherford was a man who made his mark, and who will not soon be forgotten. J. G. M.

NOTES.

A FINE monument of Pasteur was unveiled at Lille on April 9. The new buildings of the Pasteur Institute at Lille were opened on the same day.

SIR RICHARD THORNE THORNE, K.C.B., F.R.S., has been elected a member of the Athenæum Club, under the rule which empowers the annual election of nine persons "of distinguished eminence in science, literature, the arts, or for public services."