science of industrial management," demanding special qualities and the amplest training, the aim being to secure "a large increase in the wage-earning capacity of the workman," and "a still larger decrease in the labour cost of his product." But not only is it necessary to consider the efficiency of the workman as such, but thought must be given to his life as a citizen; in short, not only economic but ethical considerations must have place, since industry demands the humanising influence of the most cultivated intelligence to ensure its complete success. In the words of Prof. Smithells: "Professions and business vocations are more and more becoming learned callings, each developing a special body of knowledge, which requires for its full mastery and effective use an intellectual training of what may be called the university standard."

The demand for this in respect of the great engineering and chemical industries has long been recognised and met in Germany. Hence the importance given to chemical and physical science, and the lavish provision made for its teaching in nearly all her great universities, and to engineering in her technical high schools, of which, if the Polytechnikum at Zurich be included, there are now twelve with upwards of 13,000 day students taking full four-year courses, nearly all of them as a condition of entrance demanding from engineering students at least one year's experience in a works, and no admission except to duly accredited students from a gymnasium or school of equal standing. These schools are all—*vide* Dr. Nicolson's recent report—largely increasing their engineering equipment, so as to bring it up to the latest advance in engineering science and equipment, and with a view to further investigation and experiment in the service of the industries. Having regard to this equipment, to the spirit of investigation and research, and to the large body of highly educated students, we cannot be surprised at the position Germany now takes in the world of applied chemistry and engineering.

It is further stated upon high authority that the exceptional expenditure on new plant and buildings at eight German technical high schools, including that of Zurich, during the last five years has been 785,000*l*. If Englishmen mean to maintain their great industrial position they must follow in the steps of Germany, since in many important spheres of engineering practice she even now takes the lead. It would be an interesting inquiry, perhaps somewhat disquieting in its results, to learn how many German patents are at this moment being worked in this country under licence.

During the last few years there has been a definite movement on the part of certain of our large technical institutions towards a closer connection with the universities within their own area, of which there are now thirteen in England and Wales, compared with three teaching and self-examining universities prior to 1880, marking an immense progress in the organisation of higher education within a generation. Of such institutions may be named Manchester, Bristol, Glasgow, Edinburgh, Belfast, and certain of the London technical institutions. Students in each of these institutions fulfilling the required conditions are now eligible for the degrees of their respective local universities to which they are attached. It is to be observed also that the ancient universities of Oxford and Cambridge have now strong technological departments, which help to put English institutions, though still far behind as a whole, in a much more favourable light than would at first appear on a comparison with Germany.

In this connection it is convenient to note the wisdom and liberality of the policy of the Royal Commissioners for the Exhibition of 1851, whose scheme of science scholarships has been so fruitful in result, in the establishment in 1911 of the scheme of industrial bursaries to enable graduates of certain defined institutions to enter upon industrial work at the close of their ordinary university course, thus enabling those men whose qualifications fitted them well to take part in the application of science in the industries, but who were often diverted to less suitable employment by the necessity of earning a livelihood, to be relieved from constraint in their choice of occupation, and to enter into positions more suitable to their training and abilities. Eighteen bursaries were awarded, the payments ranging from 35*l*. to 100*l*. per annum, varying according to salary and circumstances.

It is gratifying to note the great progress which has been achieved in scientific and technical education during even the last twenty years, the more sympathetic attitude of employers in the important industries, the increased liberal support, still far from the amount the circumstances demand, of the Imperial Government, and generally the growing appreciation by the public of the value and necessity of the best possible education in due degree for all the children of the nation.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

BIRMINGHAM.—At the annual meeting of the Court of Governors, Prof. G. Barling was elected Vice-Chancellor of the University to fill the vacancy caused by the death of Alderman C. G. Beale. It is understood that in consequence of his election to this position, Prof. Barling will resign the chair of surgery, which he has held since the foundation of the University. He recently resigned his post of dean of the faculty of medicine, which he had held for six years, being succeeded by Prof. Peter Thompson.

The council, having received an offer from the Board of Agriculture of a grant-in-aid, to be expended in carrying on a research department in agricultural zoology, has appointed Prof. F. W. Gamble, F.R.S., as director of the new department. An assistant director is to be appointed, who will devote his whole time to the duties, under the supervision of Prof. Gamble. It is understood that the department will specialise in helminthology.

CAMBRIDGE.—Prof. H. F. Newall has conveyed to the Vice-Chancellor, on behalf of a donor who desires to be anonymous, an offer to the University of an endowment for the professorship of astrophysics. In the course of his letter, Prof. Newall remarks:—"The transfer of the Solar Physics Observatory to Cambridge introduces into the University a new study. The fresh opportunities and obligations which it opens up can better be met by fresh endowments sufficient to secure permanently the services of a professor of astrophysics (who would also be responsible for solar physics) than by any measure that involves the diversion of the services of the Plumian professor from the development of dynamical astronomy and from the training of men in that department of knowledge. If such a permanent professorship of astrophysics be established, it is desirable that its emoluments should be sufficient to attract really able men, and to raise it to a high rank among university posts." This statement of the position of the subject was placed before the anonymous benefactor, who has empowered Prof. Newall to convey the following offer to the Vice-Chancellor:—"Should the University concur in the views you have expressed to me, I am

prepared on the occurrence of the first vacancy in the chair of astrophysics to contribute a sum of ten thousand pounds towards the permanent endowment of the chair, provided that the University is willing to undertake to supplement this sum by such further endowment either of principal or of income as will raise the emoluments of the chair thenceforward to 800*l*. a year."

Mr. C. Hankins, forester to Earl Cadogan, has been appointed adviser in forestry. He will be under the supervision of the reader in forestry, under whose responsibility all working plans and proposals of a general nature will be issued.

OXFORD.—The proposal to allocate a site in the University Park for the erection of an engineering laboratory has been dropped, it being understood that a suitable piece of ground will be available for this purpose without encroaching on the open space which adds so greatly to the amenities of Oxford.

MR. W. JAMES THOMAS, of Ynyshir, has increased his gift of 10,000 guineas to the University College of South Wales and Monmouthshire to 12,750*l*. in order to cover the full cost of erecting a medical school.

A LEADING article in *The Chemical World* on the Oxford University Laboratory directs attention to the remarkable developments that are in progress in the teaching of chemistry in the Universities of Oxford and Cambridge. Since the institution of the new *régime* at Cambridge, four years ago, 150 original communications have been published from the chemical laboratory of that University, a record that is probably unequalled by any laboratory in this country or elsewhere. In the same period the number of graduate and post-graduate students in the laboratories has more than doubled. There can be little doubt that similar developments are to be anticipated at Oxford, following the recent election of Prof. W. H. Perkin to the chair of chemistry.

THE governing body of the University of Wisconsin has decided, says *Science*, to ask the State legislature, now in session, for 200,000*l*., to be granted in sums of 50,000*l*. a year for four years, in order to provide and equip further accommodation for men students. The continuance of the present appropriation of 60,000*l*. a year for the construction and equipping of academic buildings will also be requested. For the further development of university extension work, an increase of 5000*l*. a year is desired. Owing to the reduction in the assessed valuation of personal property, resulting from the adoption of the income tax in Wisconsin, the University's fund for current expenses has this year fallen below the amount anticipated. The governors, therefore, have requested that the sum of 18,500*l*. be appropriated to make up this year's decrease, that 35,000*l*. be provided for next year's decrease, and 45,000*l*. for the following year's decrease.

VERY important developments are now taking place in the Royal (Dick) Veterinary College in Edinburgh. Not the least important is the removal from the present limited quarters to what will in a year or two be a fine addition to the many colleges which adorn the city. To make room for the new buildings, some quaint cottages of a bygone epoch will have to be removed. These are in what is known as Summerhall Square, which lies to the east of the East Meadows in the southern part of Edinburgh. The main frontage of the buildings will face west, and in the rear the clinical department will be housed in buildings quite distinct from those devoted to teaching and administration. The various laboratories and class-rooms will be equipped with the best modern appliances for the study of the diseases and treatment of domestic animals. Another important development is the establishment of a degree in veterinary science in the University of Edinburgh. The regulations require the student to attend certain of the more purely scientific courses in the University, but the more technical part of the training is given in the Royal Veterinary College. Though no nearer to the University than the present college building, the new buildings will be much more conveniently situated, and the practical affiliation of the two institutions will be more thoroughly effected. It is expected that the new college will be ready for use in October, 1914.

ON February 13 a brilliant University function was held in the Library Hall of Edinburgh University, when Sir William Turner's portrait was presented by the subscribers to the University. Mr. A. J. Balfour, M.P., the Chancellor of the University, presided, and received the portrait from Sir Robert Findlay, M.P., who presented it in the name of the many subscribers. Sir Robert Findlay, himself an old pupil of Sir William's, spoke of the sixty years' service which Sir William had rendered to the University, first as assistant to Prof. Goodsir, then as professor of anatomy, and finally as principal of the University. As Sir Robert made the presentation, the curtain was drawn aside and revealed a striking and happy portraiture of the veteran principal, by the hand of Sir James Guthrie, president of the Royal Scottish Academy. Mr. Balfour, in his remarks, dwelt on the remarkable developments which had taken place during the last fifty years in university life in Edinburgh. In making their University keep up with modern needs, Sir William Turner was the man who above all others had taken the greatest share in this development. He combined in an unusual way the qualities of a great teacher and a great administrator. Lord Provost Inches having expressed the high appreciation which the Corporation had for Sir William, whom a few years since they had enrolled as a burgess of their city, Sir William Turner, after thanking his many friends and old students for their great kindness, gave some interesting reminiscences of the early days in which he began his life in Edinburgh. Although he could not claim Edinburgh as his birthplace, he was sure no one could love the old city better than he did, or could have a higher regard for its historic associations and its peculiar and indefinable charm. The ceremony they had been engaged in would remain in his mind, during the brief period that he might look to for a continuance of life, as a mark of confidence and esteem from his colleagues, students, and friends.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 13.—Sir Archibald Geikie, K.C.B., president, in the chair.—Prof. R. A. **Sampson**: A Cassegrain reflector with corrected field. The purpose of this memoir is to discover an appliance which shall correct in a practical manner the faults of the field of a Cassegrain telescope while leaving unimpaired its characteristic features of great focal length, convenient position of the observer and achromatism. It is shown in agreement with the investigation of Schwarzschild that two mirrors alone cannot correct the field without introducing impracticable curves or sacrificing the general design. A system of lenses is investigated which shall effect the purpose. Three lenses is the least number which can satisfy the two conditions of achromatism.