berger, is being introduced on a large scale in Norway by the Badische Anilin- und Sodafabrik. In this process air is passed through an iron tube in which an alternating-current arc of 5-metre length is maintained under a pressure of 4200 volts. The air enters one end of the tube by a series of tangential holes, and the rotary motion thus produced keeps the arc confined to the axis of the tube. Each arc absorbs 600 horse-power.

Electricity in Agriculture.

The discovery that electrification of the atmosphere immediately above the plant stimulates in certain cases its growth is now being utilised practically under a system worked out by Sir Oliver Lodge, in collaboration with Mr. J. E. Newman and Mr. R. Bomford. A network of galvanised iron wires is stretched over the field to be treated, and suspended 18 feet from the ground from wooden posts and oil insulators. The posts are placed 70 yards apart, so that about one post per acre is required. The network is positively electrified to from 60,000 to 100,000 volts by means of an induction-coil mercury gas break and Lodge rectifying vacuum valves. The induction coil is worked on the primary side by continuous current obtained from an ordinary dynamo. The amount of primary power required per acre is very small, namely, from 10 to 20 watts. The installation is run for five or six months during eight to ten hours each day, and the total expenditure of energy is only about 20 B.O.T. units per annum per acre. Under this treatment the increase in the yield per acre is about 30 per cent., but under certain conditions it may be even more. The system is in use on several farms in this country, on six farms in Germany, and on one farm in Holland.

In the time at my disposal I have only been able to refer to a few of the industries which have benefited by the application of electricity; but when one reflects that nearly every industry in the country has been, or might be, furthered by the use of electricity in one form or another one comes to see that an enormous field of useful work is open to the electrical engineer—not only useful to himself, but even more so to the interests that employ him. How, then, comes it that electrical engineering is not so prosperous as it might be? Some of our members say because we are backward as compared with our foreign competitors. If by that term they mean that our electrical engineering works cannot produce equally good plant as our rivals, I cannot agree. I have frequently visited Continental shops, and, although I am quite willing to admit that excellent work is done there, I am also convinced that British shops can turn out work equally well and generally at a slightly lower prime cost. There is certainly no justification in reproaching the makers of electrical plant with backwardness; and, moreover, it is bad business policy. If, however, the reproach is levelled against the potential users of such plant there is some justification, and also a reason. Our great staple industries are old-established and have been fairly prosperous for generations; those on the Continent are of recent growth, and had to struggle into existence against English competition. To become successful they had to adopt every improvement which science put at their disposal. With them the application of electricity is almost a vital matter; with us only a desirable improvement. Is it, then, to be wondered at if a works manager or owner, who has grown up in the pre-electric days, and has been doing a prosperous business ever since, should be rather slow in embarking in new methods of working which, to his thinking, might entail the possibility of risk and the certainty of greater mental exertion? There are, of course, exceptions, and a good many of them, as witnessed by the great strides which electrical methods applied to our staple industries have already made; but, compared to what the development might be, we must admit that we have as yet only touched the fringe of this vast field. There is progress, but it is not fast enough, and to accelerate it we must educate the potential users of electrical plant. A beginning in this direction has already been made by the managers of electric-light stations. They are educating the householder by local exhibitions and literature that he can understand. On the Continent every large electrical engineering firm has a literary department, the business of which it is to educate possible customers. No sooner is a new winding plant started, or a cotton mill electrically equipped, than well-written, well-printed, and beautifully illustrated leaflets are sent out into the world to tell possible clients of the work done by the firm. Here, such literary departments are the exception; and thus it comes about that we hear so much of the great advances made on the Continent and so little concerning equally good work done here.

Our institution can also do something to accelerate the introduction of electricity into our great industries. It is no doubt very useful if we in our meetings read highly technical papers, and thus educate each other; but this is only part of our work. The other part is to educate the customer, and for this purpose we possess in our organisation of local sections the requisite machinery. By arranging for papers which shall be of interest to the particular industries carried on in the district of each local section, our institution can further the adoption of electricity in these industries, and this will not only be to our own advantage, but even more to the advantage of those whom we serve.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The professorship of biology will be vacant on January 1, 1910, by the resignation of Prof. Bateson as from that date. Candidates for the professorship should communicate with the Vice-Chancellor on or before Monday, January 10. The professor will receive a stipend of 700*l.* a year, with the usual deductions in case he holds a fellowship. It will be the duty of the professor to promote by teaching and research the knowledge of genetics.

The Balfour studentship will be vacant at Christmas, 1909. The names of applicants, together with such information as they may think desirable, should be sent on or before January 15, 1910, to the secretary, Mr. J. W. Clark, Registry of the University, Cambridge.

Dr. Whitehead has been appointed chairman of the examiners for the mathematical tripos, part i., 1910.

Mr. W. B. Hardy has been nominated a manager of the Quick fund from January 1, 1910, to December 31, 1915.

The electors to the Isaac Newton studentships give notice that, in accordance with the regulations, an election to a studentship will be held in the Lent term, 1910. These studentships are for the encouragement of study and research in astronomy (especially gravitational astronomy, but including other branches of astronomy and astronomical physics) and physical optics. The studentship will be tenable for the term of three years from April 15, 1910. The emolument of the student will be 200*l.* per annum, provided that the income of the fund is capable of bearing such charge. Candidates for the studentship should send in their applications to the Vice-Chancellor between January 16 and 26, 1910, together with testimonials and such other evidence as to their qualifications and their proposed course of study or research as they may think fit. Candidates are recommended to send with their applications an account of any work bearing on astronomy or physical optics on which they may have been engaged, and to forward copies of any papers they may have published on these subjects.

The special board for moral science directs attention to the urgent need of more adequate accommodation for the laboratory of experimental psychology. Since 1897, when the lectureship in experimental psychology was first established, this department has been successively housed in various temporary quarters, all totally unfitted for the purpose. At Oxford an excellent laboratory devoted to experimental psychology has recently been erected, presided over by a reader, who is a Cambridge man. This laboratory was built and is maintained at the expense of the University. The board is of opinion that it is essential that a similarly permanent and satisfactory building should be provided without delay in Cambridge if instruction and research in this important new subject are not to cease.

BIRMINGHAM.—The Huxley lecture this year is to be delivered on December 1 by Prof. W. Bateson, F.R.S., who has selected "Mendelian Heredity" as the subject of his address.

MR. FRANCIS DARWIN, F.R.S., Prof. Westlake, of Cambridge, and Prof. Holland, of Oxford, have been created Doctors of the University of Brussels. Mr. Darwin has also been made a corresponding member of the Institut National of Geneva.

THE Brussels correspondent of the *Times* states that a great scientific meeting was held on November 21 at the Solvay Institute in connection with the Brussels University celebrations. A cheque for 160,000*l.* was presented on November 19 by the friends of the University.

DR. D. WATERSTON has been appointed professor of anatomy in King's College, London, in succession to Prof. Peter Thompson, appointed professor of anatomy in the Birmingham University. Dr. G. C. Low has been elected lecturer in parasitology and medical entomology.

THE new botanical laboratories at University College, London, will be opened on Friday, December 17, by Dr. D. H. Scott, F.R.S. The Vice-Chancellor (Prof. M. J. M. Hill, F.R.S.) will preside. Applications for tickets of admission should be made to the secretary, University College, London, W.C.

AT a meeting of the East London College committee on November 16 a subcommittee was constituted to administer the fund for the encouragement of research work at the college, upon which Mr. H. F. Donaldson, C.B., Dr. H. A. Miers, F.R.S. (principal of the University of London), and Sir William White, K.C.B., F.R.S., were asked to serve.

A COPY of the October issue of the *Battersea Polytechnic Magazine* has been received. The periodical provides an interesting record of the doings of the various societies and clubs in connection with the institution, as well as readable articles by members of the staff and students. Great prominence is given to the work of the day section of the Engineering Society; the issue of the magazine before us, for example, contains full descriptive accounts of four visits to important engineering undertakings, in addition to complete particulars of the annual meeting of the society.

THE School Board of Hartford, Connecticut, has decided to establish a "tent school" for children from homes where there is tuberculosis, and for children who suffer from anæmia or curvature of the spine. The tents will be put up on some vacant ground in the neighbourhood of one of the city's school buildings. Accommodation will be provided for sixty or more children, who will spend about seven hours a day in the tents. Books and furniture will be supplied by the School Board, but the Hartford Society for the Prevention of Tuberculosis will furnish meals and the especially warm clothing that will be needed for such an experiment during the winter.

DR. RICHARD ARTHUR, president of the Immigration League of Australasia, points out in a circular letter that the Government agricultural colleges in Australia offer exceptional advantages in the way of a scientific and practical education in the various forms of agriculture, stock-breeding, dairying, and fruit-growing. He has been able to make arrangements for the reception of students from the United Kingdom at them, and informs us that any lad going to Australia can now be guaranteed entrance at one or other of these institutions. The course is a two-year one, and the fees are exceedingly moderate, ranging from 18*l.* to 30*l.* a year, which sum includes board and lodging.

WE learn from *Science* that by the will of the late Mr. John S. Kennedy, banker, of New York City, who died last October in his eightieth year, bequests are made for public purposes amounting to nearly 6,000,000*l.* A bequest of 445,000*l.* is made to Columbia University; another of 300,000*l.* to Robert College, Constantinople; and a bequest of 150,000*l.* to New York University. Gifts of 20,000*l.* are made to the University of Glasgow, Yale University, Amherst College, Williams College, Dartmouth College, Bowdoin College, Hamilton College, the Protestant College at Beirut, the Tuskegee Institute, and Hampden Institute; and of 10,000*l.* to Lafayette College, Oberlin College, Wellesley College, Barnard College (Columbia University), Teachers College (Columbia University), Elmira College, Northfield Seminary, Berea College, Mt. Hermon Boys' School, and Anatolia College, Turkey. Bequests of 5000*l.* are made to Lake Forest University and Center College.

A UNION has recently been formed by graduates of the University of London to promote the Parliamentary enfranchisement of women on the same terms as men. Since 1878 the University of London has admitted women as candidates for all degrees, honours, and prizes on precisely the same terms as men, and at the present day in all university affairs men and women are accorded the same electoral and other rights, and acquire them through identical qualifications. Graduates of a certain standing are entitled to become members of Convocation, and the register of Convocation would constitute the Parliamentary electoral roll were it not for the condition imposed by Act of Parliament that a Parliamentary voter must be of the male sex. About one-sixth of the members of Convocation are thus deprived of any share in the choice of the representative of their university in Parliament. That such exclusion of an intellectual section of the nation from representation in its councils is contrary to public policy cannot be denied. The university qualification for the vote is a purely intellectual one, and those who do not recognise its sufficiency in the case of one sex would have a difficult task to maintain the right of the other to the privilege attaching to that qualification. All graduates of the University of London—both men and women—who are in sympathy with the objects of the union are urged to join it. Particulars and forms of membership can be obtained from Miss Jessie W. Scott, hon. sec. London Graduates' Union for Woman Suffrage, 114A Harley Street.

THE prospects in the matter of the inauguration of a Teachers' Registration Council are much brighter as a result of a conference held on November 13, when representatives of all the important teachers' associations met together, under the presidency of Sir Herbert Cozens-Hardy, Master of the Rolls, to discuss the whole question of registration and to pass resolutions expressing the general feeling of teachers throughout the country. The proposals agreed upon include the establishment of a council on which elementary, secondary, and technical education are represented equally, each by nine representatives, and associations of teachers not included under these three heads by three representatives. Technological education is given a very wide interpretation in the proposed scheme, and includes the work done in technical schools, schools of art, and by teachers of music, of commercial subjects and physical education in its various branches. There were few points on which the meeting had difficulty in coming to practically unanimous conclusions, and armed with the resolutions now adopted the representatives of the conference should have little trouble in convincing the Board of Education that the time has arrived when the provisions included in Education Acts, which long since came into force, for the establishment of a Teachers' Registration Council should be put into force. The work of education is, from the national point of view, of prime importance, and any procedure deserves encouragement which will improve the status of the teaching profession.

SIR JOHN HEWETT opened the new laboratories and workshops at Thomason College, Roorkee, at the end of October last, and the address he gave on that occasion is printed in the *Pioneer Mail* of November 5. The speech was the first statement of the general policy accepted by the provincial Government for the development of technical and industrial education. The encouragement of education in applied science was taken up by Sir John Hewett at an early stage of his administration, his first step being the promotion of a technical conference. The proposals of the conference included the provision of industrial and trade schools at important centres and the improvement of the existing industrial school at Lucknow. These were to provide for the lower stages of industrial training. Our contemporary states that this scheme has been adopted by the Government, and is being given effect to as funds

are available. Eventually these establishments may be expected to provide a regular supply of trained artisans and mechanics able to adapt themselves readily to western processes. The proposals of the conference referred also to the creation of a technological institute. This institute was to have two branches—at Roorkee and Cawnpore respectively; it was intended that Roorkee should deal only with industries mainly dependent on engineering, while Cawnpore provided for those dependent on chemistry. The proposals allotted 2 lakhs capital expenditure with Rs. 88,000 annually to Roorkee, and 8 lakhs capital with 2½ lakhs annually to Cawnpore. Sir John Hewett said in his speech that the Cawnpore part of the scheme has been deferred, but that a commencement will be made at once with the development of a technological institute at Roorkee. Thomason College is to have the difficult task of working out the lines on which the functions of a technological institute can be carried out in India.

SOCIETIES AND ACADEMIES.

LONDON.

Geological Society, November 3.—Prof. W. J. Sollas, F.R.S., president, in the chair.—S. S. **Buckman**: Certain Jurassic (Lias-Oolite) strata of south Dorset, and their correlation. Descriptions of certain strata (Lower Bathonian to Pliensbachian) on the Dorset coast. Comparison is made with similar strata inland. The strata described are classified according to the scheme introduced for these strata in 1893. The strata are arranged among thirty-six zonal (hemeral) divisions. The Upper Lias part of the junction-bed of Down Cliffs, Chideock, is a very condensed, imperfect epitome in 20 inches of about 80 feet of strata on the Yorkshire coast. Between the *bifrons*-layer and the *striatulus*-layer of the junction-bed there is occasionally a 2-inch layer, which is all that represents some 250 feet of deposit in the Cotteswolds. The Upper Toarcian makes a great showing at Burton Bradstock and Down Cliffs as the Down Cliffs Clay and Bridport Sands. The sequence of *aalensis*-strata above *moorei*-beds is demonstrated at Chideock Quarry Hill, in the upper part of the Bridport Sands. The Inferior Oolite strata of Burton and Chideock are not counterparts of one another; they supplement each other to a certain extent. Mr. Thompson's zonal scheme for the Upper Lias is considered.—S. S. **Buckman**: Certain Jurassic ("Inferior Oolite") Ammonites and Brachiopoda. The paper describes certain species of Ammonites and Brachiopoda which are important for the identification, the correlation, or the dating of Inferior Oolite deposits, and certain other notable species which, having frequently attracted attention in the field, require naming in the interest of future workers.—Dr. W. F. **Hume**: The granite-ridges of Kharga Oasis: intrusive or tectonic? The author quotes the records given by Mr. Beadnell in his paper published in February, 1909, and although in agreement with the facts there stated, differs with regard to the interpretation of those facts. Whereas Mr. Beadnell regards the granite as intrusive, on account of the high dip of the sedimentaries, and the changes which they exhibit as regards colour and hardness, near the granite, the author considers that the dips are due to fold-movements almost at right angles to one another, since they lie on the same line as the crater-like basins, the rims of which are formed of the compact and steeply dipping limestones of the Lower Eocene, and he adduces as further evidence the fact that dykes and quartz-veins penetrating the crystalline rocks cease abruptly at the edge of the sandstone.—Dr. W. F. **Hume**: The Cretaceous and Eocene strata of Egypt. The fossiliferous Cretaceous strata are divided into three series:—(1) A northern Antonian type, marked by Cenomanian species, including typical Turonian strata. (2) A central Egyptian or Hammama type, Cenomanian strata being absent, Campanian marked by abundance of *Ostrea villei* and *Trigonarca multidentata*, and phosphatic beds; the Danian portion having an eastern facies, in which Pecten marls are a characteristic feature, and a western chalky limestone indicating a close affinity with the white chalk of northern Europe. (3) A southern or Dungul type, having close affinities with (2), but in the Campanian the phosphatic beds are inconspicuous, and the fauna consists of a group of specialised sea-urchins and of gastropods, among which Turritellæ are very prominent. The uniformity of the Lower Eocene throughout Egypt is emphasised, its triple subdivision being recognisable over vast areas. In the Middle Eocene this uniformity is replaced by differentiation. Five zones have been recognised in the lower division, while in the Upper Moqattam the Turritella-beds and the strata rich in *Carolia placunoides* and *Plicatula polymorpha* are of zonal importance. The Lower Moqattam is considered as beginning with the *Nummulites gizehensis* zone and closing with the Gistortia-bed. The relation between the Cretaceous and Eocene beds is discussed. Palæontologically, great groups such as the Ammonites, still abundant in the Upper Cretaceous, disappear in the Eocene, and are replaced by the characteristic nummulinid Foraminifera. Both periods bear a resemblance to each other in the dominance of oysters and sea-urchins. A notable feature is the rarity of Brachiopoda in Egypt throughout both periods, nor have belemnites been recorded from the Egyptian Cretaceous. Among post-Eocene formations the calcareous grits are shown to have a wide extension, but in the desert they differ in character from the mammal-yielding beds of the Fayûm. The Cretaceous period in Egypt was one, in the main, marked by the gain of sea over land, the Eocene was one of rest, while at the close of the Eocene and during the Oligocene the approach of a continental phase is clearly indicated.

Linnean Society, November 4.—Dr. D. H. Scott, F.R.S., president, in the chair.—Cecil **Carus-Wilson**: Natural inclusion of stones in woody tissue. About twenty-three years ago a gravel-pit was started in the valley-gravels occurring some three miles from Faversham, in Kent. Part of a wood covered the deposit; as the work progressed oak trees were felled, and the stumps and roots dislodged. The gravel consists of subangular, water-worn flints and occasional blocks of Sarsen-stone, the whole being mixed with flint grit and quartzose sand. The roots and stumps were distributed as the gravel in which they were embedded was removed. The work of excavating ceased about ten years ago, so the roots still remaining have been exposed for that length of time, the others having been cut up for fuel. Most of those now found were left intact because of the stones enclosed in the wood. Not only did these resist the work of saw and axe, but when burnt they burst asunder with force, becoming a source of danger. The stones are actually embedded in the solid oak. The tissue of the wood appears to have grown around the stones and enveloped them, indicating that the process was carried on under conditions of pressure. There are dozens of stones embedded in some of these roots, so that the substance may be described as "a conglomerate formed of flints enclosed in a woody matrix." In one specimen no fewer than sixty-seven flints were counted, the largest being several pounds in weight, and there are innumerable empty cavities showing where others existed before the shrinkage of the wood after exposure. Odd stones have been occasionally seen thus embedded in the trunks of trees. In Norton Churchyard, a few miles from Faversham, are three old yew trees, and in two of them flints and fragments of tiles have been seen embedded in the wood of the trunk 7 feet above the ground. In Molash Churchyard, six or seven miles south of Faversham, there are six very old and large yews. Some of these have flints embedded in their trunks 7 feet or 8 feet above the ground. The examples first described are unique, and if trees can enclose stones in such quantities, and retain them within their substance so tenaciously, we have transporting agents capable, under certain conditions, of distributing terrigenous material over sea-beds to an extent not hitherto appreciated.—Dr. A. B. **Rendle**: Specimen of heather (*Erica cinerea*) found near Axminster in which the flowers were replaced by dark red leaf-buds of about the same size as the flowers. The red leaf-buds, which occupy the position of flowers, consist each of short, strongly ascending leaves arranged in superposed whorls of four; the four lines have often a spiral twist in the upper part of the bud. The leaf-arrangement resembles that of the flower, not of the foliage leaves. The leaves of these special buds differ in form from the foliage leaves in that they are upwardly concave with a bluntly keeled back. They are thirty-two or more in