the two storage lakes, which are joined together by a tunnel a mile long, by two ducts, together 4·63 miles long, to the forebay at the top of the great precipitous scarp which forms the western boundary of the Deccan plateau. From there the two lines of steel pipes are taken down the steep slopes and precipices to the power-house, about 1750 ft. below the forebay, the length of single line being about 2·33 miles. The pipes at the top are $82\frac{1}{2}$ in. in internal diameter, and at about two-thirds of the total height down the diameter is 72 in. Here they are joined by a double swan-neck pipe, from which eight smaller pipes are led down to the power-house, their diameter being $3\frac{1}{2}$ ft. at the top, and 3 ft. 2 in. at the bottom. The thickness of the metal at the top of the large pipes is $\frac{3}{8}$ in., and at the bottom of the small pipes $1\frac{1}{4}$ in.

Each of the lower smaller eight pipes supplies a Pelton-wheel turbine, designed to give a maximum of 13,500 h.p. with automatic regulation devices.

The works described are the first to be undertaken of a number of similar works proposed by the author, he having shown that it is financially possible in India to store water for use during eight or nine months of the year, and give power at a much cheaper cost than by the use of coal, oil, or spirit from vegetable products; likewise cheaper than power from the wind, sun, or tides. Not only that, but the water after use is available for irrigation, so valuable in a country without a drop of rain for a large part of the year. This would ensure the growth of the raw materials required for finished products on which the country is now so dependent upon other countries. It would also supply the factory workers or others with food and drink, and help to prevent famines, besides doing much to regularise the rainfall. Such power will provide electric traction for raw materials to, and finished products from, the factories, as well as light for them and neighbouring towns, produce fertilisers, and give the great heat required for the smelting of ores. Many industries would then be self-contained, and India could compete with Europe, America, or Japan for its finished products, and would become less dependent upon its agriculture, which the varying seasons render somewhat capricious.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

EDINBURGH.—The University, which as yet has no professor of geography and only one lecturer on the subject, as compared with three professors and five lecturers in branches of history, has recently so far recognised its growing importance as to institute a diploma in geography, based on regulations involving a thorough and far-reaching study of certain aspects of geographical science. The diploma is intended for graduates in arts or science prepared to devote an additional *annus academicus* to the subject, and capable of passing an examination of somewhat high standard. The limited number of courses in pure geography available in the University under present conditions has made it necessary to have recourse extensively to other departments, and the aim of the regulations appears to be to induce students to specialise either in historical and economic geography or, but less markedly, in mathematical geography. A special feature is the stress laid upon economic ethnography, defined as the study of the influence of geographical environment on the life of the most important peoples. The regulations give much less scope to graduates whose tastes lie in the direction of physical geography in the wide sense, and, in view of the contributions which Scotland has made to oceanography and meteorology, it is remarkable that neither of these subjects finds a place in the list. Further, geology, which, especially in its physical aspects, has always had so many adherents in Scotland, is represented only by one optional course, and, like general geography, does not appear among the subjects of the diploma examination; nor does any branch of biology find a place there. Should it be found possible later to enlarge the department by the addition of new lecturers, the present diploma might fittingly become one in economic geography.

THE Aitchison memorial scholarship, founded in memory of the late Mr. James Aitchison, and tenable at the Northampton Polytechnic Institute for two years, 1918–20, has been awarded to Mr. V. C. Milligen, Goodmayes, Essex.

WE learn from the *Times* that the council of Clifton College has just received the sum of 1000*l*. from an old Cliftonian, Mr. W. J. Leonard, for the establishment of a leaving scholarship to Oxford and Cambridge in chemistry, physics, or biology, in memory of the mastership at Clifton of Mr. T. W. Dunn, assistant master and house master at Clifton from 1868 to 1878. While the scholarship is to be given to enable boys of good promise to pursue the study of natural science at the old Universities, it is only to be awarded to a candidate who has been in the sixth, or at least the fifth, form on the classical side.

THE Labour Party at its meeting on November 14 at the Royal Albert Hall to open the election campaign of the party adopted the programme drawn up by its executive committee. Of the twenty demands contained in the manifesto one deals with education, and runs as follows:—"A national system of education, free and effectively open to all persons, irrespective of their means, from the nursery school to the university; based on the principle of extending to persons of all ages, without distinction of class or wealth and without any taint of militarism, genuine opportunities for the most effective education on a broad and liberal basis, and the provision for teachers of all kinds and grades of salaries, pensions, training, and opportunities of advancement commensurate with the high social importance of their calling." No exception can be taken to the reasonableness of the ideals inspiring this statement, but it must be borne in mind frankly that not every boy and girl can benefit from a course of higher education, and that all that it is wise to insist upon is that every child shall have the opportunity of developing his intellectual powers to their fullest extent, and that social distinctions shall not be a bar to merited educational advancement.

A REPORT on the work of the Manchester Municipal College of Technology for the years 1913 to 1918 has just been published. The issue of annual reports was interrupted in 1914. The college has made its principal contribution to the task of winning the war by supplying the Army and Navy with men whose character and intelligence owe a great deal to their university training. It has supplied to the Royal Engineers, as well as to the technical branches of the Navy, Army, and Air Force, men whose training as engineers, chemists, or other technologists has enabled them to render effective service. In addition to supplying men, the college has undertaken war-work of different kinds. So great, indeed, have these new activities been that, despite the large reduction in the number of students, more research work has been done in the college during the past four years than in any other equal period of its history. The buildings and equipment have been improved in various ways during the period under review. In the summer of 1916 five new research rooms were equipped. Of these the most important is the new coal-tar products and dyestuffs research laboratory, furnished with a specially constructed electrically heated oven for giving variable and positive degrees of temperature. The increase in the expenditure of the college has been partly met by larger Government grants. In the year 1910–11 the grant received amounted to 11,895*l.*, while that received during 1915–16 was 16,646*l.*, including a special war grant of 1250*l.* Since 1902 commercial tests and investigations which could not be carried out elsewhere in or near Manchester have been undertaken by the college. The financial value of this work in 1914 was 398*l.* 14*s.* 6*d.*, whereas in 1917 it reached 2946*l.* 6*s.* 6*d.*

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 14.—Sir J. J. Thomson, president, in the chair.—A. **Mallock**: Sounds produced by drops falling on water.—G. H. **Hardy** and S. **Ramanujan**: The coefficients in the expansions of certain modular functions.—The Hon. R. J. **Strutt**: The light scattered by gases: its polarisation and intensity.—Dr. F. **Horton** and Ann C. **Davies**: An investigation of the ionising power of the positive ions from a glowing tantalum filament in helium. The ionising power of the positive ions from a glowing tantalum filament in helium has been investigated by a modification of the method due to Lenard. The positive ions were accelerated through a piece of platinum gauze into the ionisation chamber, and were there retarded by an opposing potential difference between the gauze and a movable collecting electrode, this retarding potential being constant during a series of experiments, and always greater than the greatest accelerating potential used in that series, so that none of the positive ions reached the collecting electrode. It was found that an increasing current was obtained in the ionisation chamber (the electrode collecting a negative charge) when the potential difference accelerating the positive ions was gradually raised above 20 volts. This result is similar to that obtained by Pawlow, and by Bahr and Franck, who concluded that helium atoms are ionised by the collisions of positive ions moving with 20 volts velocity. The experiments described in the paper have shown that the observed increasing current, with increasing accelerating potentials above, about 20 volts, is mainly due to the positive ions liberating electrons from the walls of the ionisation chamber which they bombard, and that the positive ions do not ionise the helium atoms even when they collide with velocities up to 200 volts.

Physical Society, October 25.—Prof. C. H. Lees, president, in the chair.—Discussion on the case for the ring electron. Dr. H. S. **Allen** discussed the arguments in favour of an electron in the form of a current circuit capable of producing magnetic effects. Then the electron, in addition to exerting electrostatic forces, behaves like a small magnet. The assumption of the ring electron removes many outstanding difficulties:—(1) There is no loss of energy by radiation as in the case of a classical electron circulating in an orbit. (2) Diamagnetic atoms must have a zero resultant magnetic moment. This is difficult to account for with electrons in orbital motion. (3) The ring electron gives a good explanation of the facts of paramagnetism, including the experimental results of K. T. Compton and Trousdale, and of A. H. Compton and O. Rognley obtained by X-ray analysis. (4) The asymmetry of certain types of radiation can be accounted for (A. H. Compton). (5) The effect of the magnetisation of iron upon its absorption coefficient for X-rays observed by Forman is explained. (6) The small amount of ionisation of gases produced by X-rays may receive an explanation. (7) Grondahl claims to have found evidence for a magnetic electron in certain thermo-electric effects. (8) Webster has given a method of deducing Planck's radiation formula by making certain assumptions as to the internal mechanism of Parson's "magneton." (9) It is suggested that Bohr's theory as to the origin of series lines in spectra may be restated so as to apply it to the ring electron. The essential points of the quantum theory and Bohr's equations may be retained, even if his atomic model be rejected. (10) If radiation is due to pulsations in a ring electron, the Zeeman effect may be deduced by reasoning similar to that first employed by Lorentz. (11) The scattering of streams of electrons from the sun due to electrostatic forces would be to some extent diminished. (12) Parson has shown that many of the problems of chemical constitution and stereochemistry may be solved by a magneton theory of the structure of the atom. *Stationary* valence electrons are possible. (13) The forces of cohesion in a solid are similar in nature to chemical forces, both sets of forces having an electromagnetic origin. The questions of the mass and magnetic moment of such a ring electron were discussed. It was pointed out that the adoption of this hypothesis would lead naturally to the acceptance of an atomic model with a magnetic core, as previously suggested by the speaker.

Mineralogical Society, November 5.—Sir William P. Beale, Bart., president, in the chair.—Dr. G. F. Herbert **Smith** and Dr. G. T. **Prior**: A plagionite-like mineral from Dumfriesshire. Specimens of antimony-lead ore collected by Lieut. Russell from Glendinning Mine contained small cavities lined with tiny black crystals, measuring less than 0·4 mm., and mostly less than 0·2 mm., across. Some resembled in habit the crystals of plagionite from the Hartz Mountains described by Lüdecke. Measurements made on the three-circle goniometer showed the crystals to belong to the semseyite end of the group, and the result of a chemical analysis of the compact material of which the crystals form part corresponded approximately with the formula $5PbS.2Sb_2S_3$. Semseyite has not previously been recorded from the British Isles.—Lieut. A. **Russell**: The chromite deposits in the Island of Unst, Shetlands. The bottle-shaped mass of serpentine which runs through the centre of the island from north to south contains chromite uniformly distributed, but varying greatly in character, being at times massive, but generally granular. More than thirty quarries are known, but only six of them have been worked to any extent. The associated minerals include kämmererite (abundant in one quarry), uvarovite, copper, hibbertite, brucite, calcite, talc, and magnetite. The rocks other than the serpentine are poor in minerals.—Dr. G. T. **Prior**: The nickeliferous iron of the meteorites of Bluff, Chandakapur, Château Renard, Cynthiana, Dhurmsala, Eli Elwah, Gnadenfrei, Kakowa, Lundsgård, New Concord, Shelburne, and Shytal. The percentage of nickeliferous iron and the ratio of iron to nickel in the several instances were found to be respectively 5, $6\frac{1}{2}$; 8, 9; $8\frac{1}{2}$, $6\frac{1}{2}$; 6, 6; $3\frac{1}{2}$, $3\frac{1}{2}$; $6\frac{1}{2}$, $7\frac{1}{2}$; $21\frac{1}{2}$, $12\frac{1}{2}$; 8, 6; $8\frac{1}{2}$, 7; 10, 8; $10\frac{1}{2}$, 10; $7\frac{1}{2}$, $6\frac{1}{2}$.

Zoological Society, November 5.—Prof. E. W. MacBride, vice-president, in the chair.—Dr. J. F. **Gemmill**: The cause of the ciliary action in the internal cavities of the Ctenophore (*Pleurobrachia pileus*).—Dr. R. T. **Leiper**: Diagnosis of helminth