

if he were asked to endow a fellowship of this annual value he would immediately have to hand over 300*l.* This method certainly lends itself admirably to the making of untried experiments in educational as well as in other matters. I do not speak altogether without practical experience of the method, and I have therefore ventured to make this digression in order to commend it to your attention.

It is of set purpose that I have discriminated sharply between the functions of the technical college; the training of large numbers of competent craftsmen or professional men, and the development of a smaller class of scientific pioneers. We must admit that the latter function is likely to make the less effective appeal to the general public; indeed, it would be surprising if it were to appeal to more than a select few. I take this to mean that within the managing body we must be satisfied to proceed cautiously in developing this function. There need be no doubt or hesitation as to the *objects* to be attained, but prudence and caution will be required in the application of the means at our disposal. *Men* are of far greater importance than *money*, and I confess to a certain distrust of schemes of scientific research which are splendid mainly because they are splendidly financed. No great research department can develop except by a process which is analogous to organic growth. If the right kind of nucleus can be placed in a suitable environment we may rest assured that nature will do the rest by her processes of cell division and multiplication. It is our part to see that the nucleus is sound and of the right kind, to provide for it the necessary environment, and to weed out all useless and undesirable growths.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Mr. R. C. Punnett has been appointed superintendent of the museum of zoology in succession to Dr. S. F. Harmer, F.R.S., who recently accepted the keepership in zoology at the British Museum (Natural History).

The Smith's prizes have been adjudged as follows:—H. W. Turnbull, Trinity College, for his essay, "The Irreducible Concomitants of Two Quadratics in *n* Variables"; G. N. Watson, Trinity College, for his essay, "The Solution of the Homogeneous Linear Difference Equation of the Second Order, and its Applications to the Theory of Linear Differential Equations of Fuchsian Type." The names are in alphabetical order.

Dr. McTaggart has been appointed chairman of the examiners for the moral sciences tripos, and Mr. H. O. Meredith chairman of the examiners for the economics tripos.

Sir Victor Horsley has been appointed Linacre lecturer at St. John's College, Cambridge. The lecture will be delivered on Thursday, May 6, the subject being "The Motor Area of the Brain."

LONDON.—Mr. G. A. Schott has been granted the degree of D.Sc. in applied mathematics as an external student, and Mr. G. W. C. Kaye has been granted the degree of D.Sc. in physics as an external student.

The medical college of the London Hospital has recently received a sum of 20,000*l.*, which has been placed in the hands of trustees. The yearly income will be spent on the advancement of medical research and the promotion of higher education in medicine. The donor wishes to remain anonymous.

The Senate has taken exception to the terms of reference to the Royal Commission on the University on the ground that the scope of the inquiry is wider than was approved by the Senate at their meeting in December, 1908, and that the Senate has not been given the opportunity to consider extended terms of reference.

OXFORD.—The following is the text of the speech delivered by Prof. Love in presenting Dr. Sven Hedin for the degree of D.Sc. *honoris causa* on March 2:—"Gaudet profecto et sibi gratulatur Academia nostra dum salutatur eum qui sicut Ulixes πολλῶν ἀνθρώπων ἴδεν ἅπτεα κτὶ νόον ἔγνω, qui Marci Poli, Christopheri Columbi, Alexandri Humboldt æmulus inter insignissimos orbis terrarum

exploratores iure numerandus est. Quippe hic ille est Sven Hedin cuius itinera periculosa hodie in ore animoque omnium sunt. Civiles palmas non minus illustres esse quam bellicas aiunt: quod si verum sit, hunc virum tanquam victorem ornare possumus, cum de ipsa Natura faciem novercalem ostendente atque atrocissime minante victoriam reportaverit. Multas hic personas eadem laude gessit, modo exploratoris impavidi qui vel multis comitantibus vel solus secum deserta perlustrat, modo ducis benigni qui nudato pede calceis aqua repletis morientis calonis sitim levat, modo scientiæ cultoris qui labores tæterrimos perpeccus regiones incognitas pedetemptim recludit. Quam diu ingentes Indiæ fluvii in Oceanum volventur, quam diu Asiæ interioris montes nivibus vestiti et aviæ solitudines manebunt, monumento hic vir non egebit."

M. DELAFOND will on July 1 next succeed M. E. Nivoit as director of the Paris National School of Mines.

THE London Inter-collegiate Scholarships Board will hold a combined examination for twenty entrance scholarships and exhibitions, tenable at University College, King's College, and the East London College, on May 11 and following days. No candidates will be admitted to the examination unless they have passed the London University matriculation or an equivalent examination, and are under the age of nineteen on May 1. The total value of scholarships offered is about 1500*l.* Full particulars and forms of entry may be obtained from the secretary of the board, Mr. Alfred E. G. Attoe, University College, Gower Street, W.C.

ANNOUNCEMENTS have been made in the Press that the Aërial League of the British Empire purposes to establish immediately a national aeronautical college. It is intended that the new college shall provide instruction in the subjects bearing upon aërial flight and navigation. Courses of study will be arranged in the mathematics, dynamics, and mechanics involved in the problem of flight, the laws of air resistance and friction, the stability of air craft, and in the meteorological, physical, and other conditions affecting aërial navigation. Workshops and laboratories, where experiments and tests can be performed, are to be included in the college, and a trial ground is to be procured. The intention is to teach completely the science and art of flying. It is satisfactory to find that the promoters of the scheme appreciate the necessity for founding practice upon scientific knowledge, and it may be hoped that the experiments to be performed will be based upon exhaustive theoretical inquiries into the mathematical principles which underlie the problems it is sought to solve by practical means.

THE annual report on the work of University College, London, shows that the total number of students during the session 1907-8 was 1361, being an increase of 170 on that of the preceding session. Of these, 229 were post-graduate and research students. The principal benefactions during the year were a bequest of 5000*l.* by the late Mr. Thomas Webb, of London and Cardiff, which is to be used for the completion of the new physiology building; a bequest of 500*l.* by Mr. H. A. Kay, to be used for the re-arrangement and re-equipment of the college buildings; a bequest of 1000*l.* by the late Prof. Bunnell Lewis; a bequest of 1541*l.* by the late Madame Halfon, for the foundation of prizes to be known as the "L. M. Rothschild" and the "Hester Rothschild" prizes; a gift by the past engineering students' committee of 410*l.*, for the new equipment of the engineering departments; and a donation of 50*l.* by Mr. Yarrow, for the provision of apparatus in the mechanical engineering department. Besides the grants from the Treasury, the India Office, and the London County Council, the college benefited during the past year by grants from the Carpenters' Company for architecture, from the Chadwick trustees for municipal engineering and hygiene, from the Drapers' Company for applied mathematics, and from the Mercers' Company for physiology. Rapid progress has been made with the new buildings for the department of physiology, which will be ready for occupation next month. The re-arrangement and re-equipment of the college buildings involved an expenditure of 5988*l.* In order to assist the deans in the two most complex faculties, those of arts

and science, the office of sub-dean has been created to provide greater facilities for giving students advice. The organisation of the arrangements for post-graduate courses and for research has been improved. The report contains lists of original papers that have been issued during the past year. The activity of the department of applied mathematics, under Prof. Karl Pearson, including the Galton Laboratory for National Eugenics, is marked by the issue of twenty-seven publications, and that of the department of chemistry, under Sir William Ramsay and Prof. J. Norman Collie, by the publication of forty original papers. The report closes with a summary of the urgent needs of the college. The need for new buildings for the department of chemistry, at a cost of about 70,000*l.*, is placed in the forefront. The Chancellor, the Earl of Rosebery, has intimated his willingness to subscribe 1000*l.* to a fund for the erection of new chemical laboratories. The expenditure for the year was 53,535*l.*

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, December 10, 1908.—“The Rotation of the Electric Arc in a Radial Magnetic Field.” By J. Nicol. Communicated by Prof. H. A. Wilson, F.R.S.

It is well known that the electric arc is deflected by a transverse magnetic field. If the electrodes are tubular and the field is radial, spreading from an iron rod lying along the axis of the electrodes, the arc will travel round these continuously. If k_1 and k_2 are the velocities, due to unit electric force, of the ions carrying the charge, the transverse velocity of the arc is $k_1 k_2 H X$, so that a measurement of this velocity will give the product $k_1 k_2$.

The measurement was made by placing a slit in front of the arc and allowing the light passing through this to fall on a rotating mirror, which reflected it into a photographic camera. The axis of rotation of the mirror almost coincided with the normal to its surface, and this caused the image of a point source to be a small circle. As the slit was only illuminated intermittently (once during each revolution of the arc) the image on the plate consisted of a number of dots arranged round a circle. Counting these enabled the velocity of the arc to be determined.

Copper arcs 1.8–3.6 mm. long, carrying currents from 2–9 amperes, were used. The magnetic field varied from 35–140 C.G.S. units, and the resulting arc velocities from 200–1100 cm. per sec.

The results of the experiments led to the formula

$$v = H(2.55 + 0.74 i)$$

connecting the velocity with the magnetic force and arc current. The values deduced for $k_1 k_2$ lie between 0.53×10^7 cm. per sec. per volt per cm. for a two-ampere arc and 1.5×10^7 for nine amperes.

Langevin has given an expression for k in terms of the mean free path, and the agitation velocity of the particle $k = e\lambda/\mu$.

This gives k for a corpuscle 1.83×10^4 , and this, combined with the experimental result 10^7 for $k_1 k_2$, gives 5.5×10^2 as the velocity of the positive ion. Since μv^2 is the same for all gases, Langevin's expression shows that $k \propto 1/\sqrt{m}$. Hence in the arc the positive ion is 900 times as heavy as a corpuscle. This mass is about the same as that found by Sir J. J. Thomson for the positive ions in the Kanalstrahlen, but much less than that of the atoms (Cu, N, or O) present in the arc.

February 11.—Sir Archibald Geikie, K.C.B., president, in the chair.—The nerves of the atrio-ventricular bundle: J. Gordon Wilson. In the introduction the author refers to the discovery of this muscular bundle and its function by Gaskell, also to the valuable work of his and the important research of Tawara upon the structure of this bundle. He points out that both Tawara and Retzer made definite statements of the existence in the bundle of nerve cells and fibres. The material used for this research was obtained from the pig, calf, and sheep; the technique employed was the methylene blue “vital” method. Conclusions:—I. Anatomically, the atrio-ventricular bundle contains, not only a special form of muscle fibre distinct from the ordinary muscle of the atrium or

the ventricle, but also an important and intricate nerve pathway, in which we find:—(1) numerous ganglion cells, monopolar, bipolar, and multipolar, the processes of which may pass (a) to adjacent ganglion cells in the bundle, (b) to the muscle fibres in the bundle, and (c) through the muscle bundle so far as it was examined; (2) abundant nerve fibres running through it in strands, the processes of which may end (a) in ganglion cells in the bundle, (b) in the muscle plexus, or pass through the part examined; (3) an intricate plexus of varicose fibrils around and in close relation to the muscle fibres of the bundle; (4) an abundant vascular supply with well-marked vaso-motor nerves and sensory endings. II. Physiologically it has been shown that the atrio-ventricular band constitutes the pathway which assures the communication of the atrio-ventricular rhythm. When the bundle is sectioned or crushed, the ventricles cease momentarily to beat, though they soon regain pulsation, but with a rhythm much more slow than that of the atrium. Pathological anatomy supports this view; the allorhythmia of Stokes-Adams disease can be explained satisfactorily by lesions involving this pathway. As a result of these physiological experiments, and from these pathological conditions, it has been asserted that the contraction wave must be myogenic. To such a deduction the author's anatomical findings are opposed. They demonstrate that in these experiments and pathological conditions an important nerve pathway is equally involved with the muscle bundle.—An experimental estimation of the theory of ancestral contributions in heredity: A. D. Darbishire. The modern experimental study of (bi-parental) inheritance is based on the assumption that the character of an organism is determined by the potentialities existent in the germ cells which produce it, and not by the nature of the parents of that organism or of its more remote ancestors. In other words, according to the former view, the attempt to predict the result of a given mating must be based on some theory as to the characters existent potentially in the germ cells of the two individuals mated, and the characters of the parents themselves and of the remoter ancestry may be left out of account altogether in the attempt to make this prediction. The present paper gives an account of an experiment designed to decide, in regard to a particular character, between these two fundamentally different theories. The result of a cross between a yellow-seeded pea and a green-seeded pea, both of pure race, is already well known. All the first generation (F_1) are yellow, and 25 per cent. of the next generation (F_2), produced by mating these yellow hybrids *inter se*, are green, the rest being yellow. These “extracted” greens, as they are called, are said to be produced, by the yellow hybrids, in the same proportion, in each successive generation (F_3 , F_4 , . . . &c.), according to a scheme which it is not necessary to give here. An extracted green in F_5 , therefore, has a great “weight” of yellow ancestry behind it, inasmuch as no green appears in that ancestry nearer than the great-great-great-grandparental generation, whilst behind that half the ancestors are yellow and half green. The author has made a number of crosses between pure yellow strains and extracted greens in F_5 . All the (F_1) hybrids thus raised were yellow, as might have been expected. With regard to the next generation, however, it is evident that if there is any truth in the view that the characters of the parents and ancestors play any part in determining the composition of a given generation, less than 25 per cent. green should occur in F_2 from this cross. No such result is obtained. The proportion of greens in F_2 is 24.88 per cent., the number of greens being 34,792 and of yellows 105,045. The probable error of the percentage is ± 0.078 . The actual deviation from the 25 per cent. expected, namely, 0.12 per cent., is not twice the probable error, and is therefore certainly not significant.—The determination of a coefficient by which the rate of diffusion of stain and other substances into living cells can be measured, and by which bacteria and other cells may be differentiated: H. C. Ross. When fresh blood is spread upon a film of agar jelly which contains Unna's stain and certain salts, the stain diffuses into the living cells, and the rapidity of diffusion depends on certain factors. It is accelerated by heat, and, of course, by time. If the jelly is alkaline, diffusion is also accelerated. Acids