in space. Even his explanation of the colours of thin films is defective. Moreover, he was hopelessly at sea, and, it may be observed, so was Huygens, in attempting to explain the absorption of light. Neither of them had at his command any mechanism but that of the collisions between particles of æther, particles of matter, and light corpuscles, and they could but juggle with the relative sizes of these things. Newton was very hard put to it to explain the difference between a perfectly transparent body and a perfectly black one, and was compelled to suppose it due to a small difference in the sizes of the particles of matter. Huygens would have liked to ascribe internal reflections at the surface of a piece of glass to collisions between the æther corpuscles and the particles of air outside, and was disconcerted by the fact that reflection took place equally well when there was no air at all. But it is quite unnecessary to follow the subject further, and discuss the contributions of Young and Fresnel, and the other men of famous names to whom the modern theories of radiation are due.

The point is simply this, that each of these great workers constructed for himself a hypothesis or model, which represented correctly certain facts known to him, and by its aid was able to use what he knew as a means to learn more. The results of his work depended upon the construction of his model, and his choice of the known facts he had made it to represent to a greater or less degree. For no one could construct a hypothesis which represented correctly all that was known. But if it was correct so far as it went it led to good results in a limited field.

Therefore it happens that hypotheses must always be diversified, and it is well for the possibilities of advance that they should be. If now we have a number of new facts regarding new radiations, if it turns out that they are to be carried over to the older radiations which have been studied for so long, and if the wave theory cannot absorb them at once, this means no rejection of the work of the past, no retracing of steps. It means rather the enriching of our opportunities of advance, in which all the good work which has been done in the past will tell as well as that which we may hope to do in the future.

If my observations are well-worn sayings, you will perhaps forgive the fact in the newness, and I should like to add, if I might, the appropriateness, of the illustration. It does, after all, make for our encouragement and efficiency if we remember that we are free to make any hypothesis we please, and that we are not to be judged directly for the choice we make, but indirectly for the use we make of it. Our reasons for choosing a scientific creed will probably be wrong; we cannot hope to do better always than Newton and Huygens. But perhaps we can do something with it which will be good and will last. It may contribute also to the general peace if we remember that our hypotheses are made, in the first instance, for our own personal use, and that we have no justification for demanding that others shall adopt the means which we find most convenient in the modelling of our own ideas.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The professor of anatomy has reappointed Dr. W. L. H. Duckworth to be senior demonstrator of human anatomy for five years from January 1, 1913, and Mr. D. G. Reid to be an additional demonstrator of human anatomy for the same period.

The Quick professor of biology has reappointed Mr. C. Warburton to be demonstrator in medical entomology as from October 1, 1912, to September 30, 1915.

The managers of the Balfour Memorial Fund give notice that the Balfour studentship will be vacant March 25. The names of applicants, together with such information as they may think desirable, should be sent on or before January 31 to the secretary, Prof. J. Stanley Gardiner, Zoological Laboratory, Cambridge.

OXFORD.—The master and fellows of University College intend to proceed, in the course of the Hilary Term, 1913, to the election of a fellow qualified to take part in the educational work of the college as prælector, with special reference to the chemistry schools, provided that a candidate suitable to the requirements of the college presents himself. Candidates must have taken a degree in a university of the United Kingdom or of the British Dominions beyond the Seas, and be unmarried. A stipend of at least 350*l.* per annum, including the emoluments of the fellowship, will be assigned to the fellow and prælector, so appointed, from the first, with prospective rise of salary proportionate to nature and length of service. The prælector in chemistry will not be precluded from undertaking further work in the University, outside the college, subject to the consent of the master and fellows from time to time. Candidates are requested to forward to the master of University College, on or before January 31, 1913, the following documents:—(1) A signed application setting forth the candidate's qualifications, and any evidence (such, *e.g.* as original work) which he may desire to lay before the electors; (2) three, and not more than three, testimonials from independent sources in his favour.

PROF. R. M. BURROWS, professor of Greek in the University of Manchester, has been appointed principal of King's College, London, in succession to the Rev. Dr. A. C. Headlam.

THE fifth annual dinner of old students of the Royal College of Science, London, will be held at the Cafe Monico, Shaftesbury Avenue, on Saturday, January 25. The president of the Old Students' Association (Sir William Crookes, O.M., F.R.S.) will preside, and the guests will include Sir Alfred Keogh, K.C.B., Sir Henry Miers, F.R.S., Sir Robert Morant, K.C.B., Lieut.-Col. Sir David Prain, C.I.E., Sir Amherst Selby-Bigge, K.C.B., Dr. R. T. Glazebrook, F.R.S., and Dr. H. Frank Heath, C.B. Tickets may be obtained on application to Mr. T. H. Humberstone, secretary of the Old Students' Association, 3 Selwood Place, South Kensington, S.W.

THE recently established University of Hong Kong is making rapid strides in the development of its various faculties, and attention is at present being specially directed to the provision of facilities for the practical study of pure and applied science. In an address delivered to the Institution of Engineers and Shipbuilders of Hong Kong last November, Prof. C. A. M. Smith, professor of engineering in the new University, made an eloquent appeal to men of wealth to assist in the important work of training Chinese students in modern science. "In Hong Kong," he said, "we wish to train men who know the East to develop China's natural resources. For that development they must obtain machinery—if we do our work aright we shall secure a market for those who are at home, and provide greatly increased freightage for the shipping to this port." Later he continued:—"We require at once machines for demonstration and experimental purposes. We want to equip laboratories for testing the materials of construction, such

as steel, concrete, copper, &c. We want oil, gas and steam engines, and refrigerators, as well as dynamos and all sorts of electrical apparatus." As an inducement to manufacturers and others to give generously, Prof. Smith said:—"We will house your gifts and keep your samples running and in good condition. We will show your present and future customers the merits of your machines, and we will advertise your goods in the centre of the greatest market of the near future." There seems every likelihood that Prof. Smith will be successful in his efforts to secure well-equipped laboratories of a modern type. Already, we understand, the Chloride Electrical Storage Co., Ltd., of Manchester, has decided to present to the University of Hong Kong a complete battery of their chloride accumulators for use in the electrical laboratory. It may be hoped that ere long each of the pieces of apparatus in the list needed at the new University, which has been circulated widely by Prof. Smith, will be secured.

SOCIETIES AND ACADEMIES.

LONDON.

Mathematical Society, January 9.—Prof. A. E. H. Love, president, and temporarily Sir Joseph Larmor, treasurer, in the chair.—J. C. **Fields**: Proofs of certain general theorems relating to orders of coincidence.—W. E. H. **Berwick**: The reduction of ideal numbers.—A. E. H. **Love**: Notes on the dynamical theory of the tides.—W. H. **Young**: Uniform oscillation of the first and second kind.—H. **Bateman**: Some definite integrals occurring in the harmonic analysis connected with a circular disc.

Royal Astronomical Society, January 10.—Dr. F. W. Dyson, F.R.S., president, in the chair.—Dr. S. S. **Hough**: The periodic errors in the right ascensions of standard catalogues. In giving an account of this paper, Sir D. Gill explained in detail the method adopted at the Cape Observatory for obtaining great accuracy in meridian observations, notwithstanding some instability in the foundations of the instruments.—Prof. **Douglass** spoke on the records of solar radiation made in Arizona.—H. E. **Wood**: Work at Union Observatory, Transvaal, and photographs of Gale's comet. The comet had two straight tails, one of them of considerable length.—Rev. A. L. **Cortie**: Sun-spots and terrestrial magnetic phenomena, 1898–1911. Second paper, the greater magnetic storms. It was concluded that while a general state of sun-spot activity corresponds with a general state of terrestrial magnetic activity, it requires the advent of a large spot, the influence of which extends in all directions, or a spot favourably situated in heliographic latitude, to disturb the equilibrium by the precipitation of a magnetic storm.—Prof. H. C. **Plummer**: The motions and distances of the brighter stars of the type B–B5, being a continuation of previous researches on stellar motions. The whole of the stars of the first type appear to be at about 200 light-years' distance, and to be very uniformly distributed in a plane, their motions being parallel to the Milky Way. The author considered that there were two star streams.—Mr. Eddington pointed out that the motions of the B-type stars were very small, and that they might be moving in a direction perpendicular to the Milky Way.—C. **Martin** and H. C. **Plummer**: The short-period variable SU Cygni. Prof. Plummer showed a diagram of the interesting light-curve of the star.

PARIS.

Academy of Sciences, December 30, 1912.—M. Lippmann in the chair.—H. **Deslandres**: The general magnetic field of the upper layers of the solar atmosphere. New verifications. Regarding the upper solar layer as strongly ionised, the behaviour of the ions in a magnetic field offers a simple explanation of the phenomena hitherto observed. Further experimental proofs are given.—A. **Haller** and Edouard **Bauer**: The formation of dimethylstyrolene, starting with phenyldimethylethyl alcohol. The alcohol was obtained by the reduction of phenyldimethylacetamide with sodium and absolute alcohol. Various by-products of the reaction are described.—The secretary announced the death of Paul Gordan, correspondant for the section of geometry.—J. **Guillaume**: Observations of the sun made at the Observatory of Lyons during the third quarter of 1912. The results of observations made on seventy-two days are given in tabular form.—M. **Luizet**: Elements of the orbit of the variable star RR Lion (BD+24°2183°).—Ch. **Gallisot**: The influence of the colour and magnitude in sudden variations of brightness of a stellar image. An account of a repetition of some experiments of Broca and Sulzer, for the case of luminous points.—Georges **Remoundos**: The theory of M. Picard and algebroid functions.—J. **Taffanel** and H. **Dautriche**: The detonation of dynamite No. 1.—G. **Eiffel**: The resistance of spheres in air in motion. An experimental study of the causes of the divergence of the author's results and those obtained at the aërodynamical laboratory at Göttingen. In the expression, $R=KSV^2$, in which R is the total resistance, S the diametral surface, V the velocity of the air, and K a constant, K is only really constant after a certain critical value of V has been reached. In the Göttingen experiments V was below this critical value. The existence of this critical velocity is of practical importance, and must be taken into account in apparatus used to measure the velocity of the wind, or of aeroplanes.—René **Arnoux**: A new method of steering aeroplanes by means of the motor.—Gustave **Plaisant**: A mode of cycloidal attack of the air.—A. **Korn**: The potentials of an attracting volume the density of which satisfies the Laplace equation.—F. **Croze**: New observations relating to the Zeeman phenomenon in the hydrogen spectrum. The author's experimental results are not in accord with those recently published by Paschen and Back. An account is given of further experiments on the cause of these discrepancies.—Guillaume de **Fontenay**: The action of inks on the photographic plate. The action is complicated, and varies greatly with the method of working.—Ch. **Boulanger** and G. **Urbain**: The theory of efflorescence. The influence of the magnitude of the crystal. An expression is given for the rates of loss of moisture of two crystals of different masses of the same material, and this is submitted to experimental confirmation with a special form of micro-balance.—Andre **Brochet**: The relation between the conductivity of acids and their absorption by hide powder. The acid absorption is a general phenomenon, and is due to a chemical combination, since whatever acid is employed the amount absorbed is sensibly proportional to the chemical equivalent.—Jean **Bielecki** and Victor **Henri**: The quantitative study of the absorption of the ultra-violet rays by fatty acids and their isomeric esters. The absorption of ultra-violet rays by acids and esters is not determined by their empirical formula. It depends on the constitution of the molecule.—H. **Labbe**: The influence of alkaline salts on the elimination of urinary ammonia in normal dogs.—Michel **Cohendy** and D. M. **Bertrand**: Living sensibilised antistaphylococcus vaccine.—A. **Trillat** and F. **Mallein**: Study of the action of the filtrate or distillate of a fresh culture of *B. proteus* on the evolution of the disease caused by pneumococcus in mice.—E. L. **Trouessart**: Migrating and sedentary forms in the ornithological fauna of Europe.—Louis **Besson**: A periodic element in the variations of the barometer.