

At the matriculation on October 21, 872 freshmen, including nine advanced students who had graduated in other Universities, were enrolled.

The Harkness Geological Scholarship for women has been awarded to Miss Hilda D. Sharpe, of Newnham College.

THE first Congregation of the *Prifysgol Cymru* (University of Wales) for conferring degrees was held in the Park Hall, Cardiff, on Friday, October 22. Ten students from Aberystwyth, Bangor, and Cardiff were admitted to the B.A. degree of the University, and five, including one lady, to the B.Sc. degree.

THE new physical laboratory and workshop at the Langton Schools, Canterbury, were formally opened on Tuesday under the presidency of the Ven. Archdeacon of Maidstone. Dean Farrar gave an address in which he traced the growth of scientific instruction in secondary schools, and emphasised the work done by the Committee of the British Association in developing the newer methods. The new rooms give the school full facilities for instruction in science, as it now comprises chemical and physical laboratories, store-room, manual workshop, and a well-equipped lecture theatre devised somewhat after the plan of the chemical lecture theatre at the Royal College of Science.

### SCIENTIFIC SERIALS.

*American Journal of Science*, October.—Fractional crystallisation of rocks, by G. F. Becker. Among the phenomena most often appealed to in support of the theory of magmatic segregation or differentiation is the symmetrical arrangement of material in certain dikes and laccolites. But this separation is more readily accounted for by the theory of fractional crystallisation. Before solidification, the lava constituting a dike or laccolite is subject to convection currents. The colder masses flowing down the sides of the bed deposit first the less fusible rock, leaving the more easily fusible mass to solidify in the centre. The process only takes weeks where a molecular flow would take centuries.—On the conditions required for attaining maximum accuracy in the determination of specific heat by the method of mixtures, by F. L. O. Wadsworth. Errors in reading temperatures are the most serious. To avoid them, the calorimeter should be small, and the surface of the solid large. The initial temperature of the latter should be as high as possible. The calorimeter should be surrounded by a water jacket, maintained at a temperature higher than the initial temperature of the water by an amount given in an equation worked out by the author. He also describes an improved calorimeter in which the body is conveyed in a small car of sheet copper along a track laid along an inclined tube which serves as a heating chamber. This prevents loss of heat, and also enables the observer to experiment upon small fragments.—On a new species of the Palurid genus *Linuparus* found in the Upper Cretaceous of Dakota, by A. E. Ortman. Two unique specimens of a hitherto unknown fossil have been acquired by Princeton University. They are the first remains of the Paluridæ found on the American continent. They not only show all the chief characteristics of the family, but are so well preserved that their generic position may be made out. The fossil is congeneric with a species living now-a-days in the Japanese seas, namely with *Linuparus trigonus*, hitherto regarded as a monotypic genus. The author calls the new species *Linuparus atavus*, and gives a full description.—On an improved heliostat invented by Alfred M. Mayer, by A. G. Mayer. The author describes a form of heliostat invented by his father, which is of simple construction and possesses certain decided advantages. It consists of a kind of wide telescope containing a large object-glass and a bi-concave lens which concentrate a parallel beam upon a system of two total-reflection prisms, one of which is mounted on the axis of rotation. A very intense beam is thus obtained, which is at the same time so free from heat that the most delicate microscopic slides may be exposed to the rays. Magnifications of 3800 diameters may thus be obtained on a screen.

*American Journal of Mathematics*, vol. xix., No. 4 (October).—On three septic surfaces, by J. E. Hill. The surfaces here discussed at some length are thus introduced: If, in the general cubo-cubic transformation between two spaces, we cause the principal sextic of one space to degenerate into a twisted quintic of deficiency 2, and into a right line meeting the quintic twice, to the general cubic surface upon which the right line lies, there will correspond in the second space, a

septic surface upon which the line is triple and the quintic is double. If, however, the principal sextic of the first space breaks up into a twisted quartic of the second kind, and into a conic, meeting the quartic four times, to the general cubic surface passed through the conic, there will correspond in the second space, a septic surface possessing the quartic doubly and the conic triply. If, however, finally, the principal sextic of the first space degenerates completely, to the general cubic, passed through two transversals, and one line, of the remaining ingredients (four lines), there will correspond, in the second space, a septic surface, possessing three lines (corresponding to the first three above) triply and three lines (corresponding to the last three) doubly.—On Sylvester's proof of the reality of the Roots of Lagrange's Determinantal Equation is an examination by Dr. Muir of the applicability of Sylvester's proof (*Phil. Mag.*, 1852) to an extension of the theorem which recently appeared in the *Phil. Mag.* Dr. Muir gets some interesting results.—Dr. Kluyver, of Leyden, writes concerning the twisted biquadratic.—M. René de Saussure, in "Calcul Géométrique Régulé," gives an analytical treatment of a subject which he had previously discussed by a purely geometrical method (see his article "tude de Géométrie Cinématique réglée," vol. xviii. No. 4).—In a note on Mr. A. B. Basset's paper, "Theory of the Action of Magnetism on Light" (vol. xix. p. 60), Dr. Larmor offers a few remarks which he hopes may be worth recording.—M. Paul Appell gives a few examples d'inversion d'intégrales doubles "que j'ai énoncé dans une courte Note des *Comptes rendus*, Fév. 1, 1897." Two Notelets are: Bemerkungen zu C. S. Pierce Quincuncial Projection, by I. Frischauf, and on the Sign of a Determinant's Term, by Ellery W. Davis.

*Bulletin of the American Mathematical Society*, October, vol. iv. No. 1.—The number opens with an account of the fourth summer meeting of the Society, which was held at Toronto on August 16-17 of the present year. Owing to the meeting of the British Association, and from other causes, the success of the gathering exceeded all anticipation. Fifty-five persons attended, and twenty-one papers were read. An analysis of the papers is given, and two of them are printed *in extenso*—concerning regular triple systems, by Prof. E. H. Moore, and collineations in a plane with invariant quadric or cubic curves, by Prof. H. S. White.—"A generating function for the number of permutations with an assigned number of sequences" is the title of a paper read by Prof. F. Morley at the May meeting of the Society. In *Liouville's Journal* 1895, and in earlier memoirs, M. André proves the formula  $P_{n,s} = s P_{n-1,s} + 2 P_{n-1,s-1} + (n-s) P_{n-1,s-2}$ , where  $P_{n,s}$  is the number of permutations of  $n$  things (say of the number 1, 2, . . .  $n$ ) with  $s$  sequences; and shows that (taking the number of sequences as great as possible) the numbers  $\frac{1}{2} P_{n+1,n}$  are the coefficients of  $x^n/n!$  in  $1/(1-\sin x)$ , when expressed as a Maclaurin series. Prof. Morley states his object to be to obtain a function of  $x$  and  $y$  which, when developed in positive integer powers of  $x$  and  $y$ , will have  $P_{n,s}$  as the general coefficient.—Dr. V. Snyder reviews "La Géométrie réglée et ses Applications," by G. Koenigs. The reviewer remarks: "One gathers that the author had intended to make the treatise much more extensive, especially as the second part of the title is entirely ignored. Roughly the book is a reproduction, with some extensions, and some omissions, of parts of three papers by Prof. Klein (*Math. Ann.*, ii. pp. 203-213; v. pp. 257-268 and pp. 278-293). Should one use the book; to enable him to better understand most of the memoirs on line-geometry, it would prove a valuable aid, but read alone, the reader would get but a narrow and one-sided idea of its usefulness."—The courses of lectures at the University of Berlin, and other fragments of mathematical news are given in the Notes.

*Symons's Monthly Meteorological Magazine*, October.—Weather maps and early synchronous meteorological observations. On June 5, 1850, the Secretary of the Smithsonian Institution wrote to Mr. Glaisher to learn what was being done in this country. Mr. Glaisher's reply is printed, and, as Mr. Symons points out, the letter is very remarkable, considering its date, and shows that the first reports made at fifty railway stations about the year 1849 were not telegraphed but were sent by train. These were collected each afternoon in London by the *Daily News*, and thirteen of them were printed in their next issue. The observations were also collated and charted day by day by Mr. Glaisher. The first daily report issued by Admiral FitzRoy was on September 6, 1860.—True time. This is a reprint of a circular by Mr. John Milne, stating that there

is no publication which shows the corresponding value in Greenwich mean time of the local time employed throughout the world. Such a table is much wanted, and is indispensable in order to determine the instant of occurrence of earthquakes, magnetic phenomena, &c.—Sunless days and the day-distribution of sunshine in summer. This is a discussion of twenty years' observations at Greenwich (1877-96). About one-fourth of our days are sunless. Spring has an average of 12½; summer, 6¼; autumn, 25°0; and winter, 48½ sunless days. The most "bright sunshine" occurs in May. During the five months May to September, 20 per cent. of the days have less than one hour's sunshine, while 14 per cent. have ten hours, or more. There are only eight cases of fourteen to fifteen hours' sunshine, and only one (in 1887) over fifteen hours.—Other papers refer to "so-called sulphur rains," "trees damaged by lightning," &c.

## SOCIETIES AND ACADEMIES.

### MANCHESTER.

Literary and Philosophical Society, October 19.—Mr. J. Cosmo Melvill, President, in the chair.—The death of Mr. James Heywood, F.R.S., the father of the Society, was announced, and a vote of condolence with the family was moved.—Prof. H. B. Dixon described experiments made in photographing explosion-flames: first, attempts made abroad, and afterwards experiments of his own.—Prof. F. E. Weiss exhibited some flowering specimens of the Dog's Mercury, which usually flowers in spring; but the plant from which the shoots exhibited were collected has been observed by Mr. F. J. George, of Chorley, for thirteen successive seasons to flower in the autumn. Sir Joseph Hooker, to whom some of these shoots had been sent, was of the opinion that this plant might be regarded as a special form with this autumn flowering character.—A paper by Mr. P. Cameron, entitled "Notes on a collection of Hymenoptera from Greymouth, New Zealand, with descriptions of new species," was communicated by the President.—Mr. Melvill afterwards exhibited some specimens of *Sisymbrium strictissimum*, found by Mr. Henry Hyde on the banks of the Mersey at Stretford.

### PARIS.

Academy of Sciences, October 18.—M. A. Chatin in the chair.—On the observation and kinematical interpretation of the phenomena discovered by Dr. Zeeman, by M. A. Cornu. The phenomenon in question, the formation of doublets and triplets in a spectrum by the action of external magnetic forces, is shown experimentally to be subject to the laws of Fresnel and Ampère. It differs essentially from the Faraday effect, in that the latter is produced upon luminous waves that have acquired a steady state, causing an alteration in the velocity of propagation, whilst in the Zeeman effect the magnetic action is exerted upon the source of the waves, and affects the period of vibration.—An account of the International Geological Congress at St. Petersburg, by M. Albert Gaudry.—On pencils and congruences, by M. Guichard.—Researches upon alcohol motors, by M. Max. Ringelmann. Two sets of trials were made, one upon a 3 h.p. horizontal, the other upon a 4 h.p. vertical oil engine. As the result of the trials it was found that the cost of alcohol, petroleum spirit, and ordinary burning oil were 5·625, 1·75 and 4·00 respectively.—On the form of the lines of electric force in the neighbourhood of a Hertz resonator, by M. Gutton. The field was explored by means of a modification of the receiver of Prof. J. C. Bose.—Densities of some easily liquefiable gases, by M. A. Leduc. The gases examined were carbon dioxide (1·5287), nitrous oxide (1·5301), hydrogen sulphide (1·1895), chlorine (2·491) and ammonia (0·5971).—On the impurities of crude copper, by M. Schlagdenhauffen. Thin sheets of crude Chilian copper, left in contact with water for several days, gave up appreciable quantities of arsenious acid and oxide of antimony. From this experiment the conclusion is drawn that arsenic and antimony are present, at any rate in part, in the form of oxide in crude copper.—On the electric conductivity of trichloroacetic acid, by M. Paul Rivals. Measurements of the conductivity and heat of solution of trichloroacetic acid at different concentrations showed that the heat of dilution of this acid is a linear function of the fraction of dissociation. The heat of neutralisation by potash (N) calculated from Ostwald's formula,  $N = 13·52 + (1 - m)d$ , where 13·52 is a constant common to both strong acids and strong bases,  $m$  is the fraction of dissociation, and  $d$  the

heat of dissociation, accorded very closely with the experimentally determined values.—On the mean molecular weight of the soluble material in germinating grains, by M. L. Maquenne.—General observations on oats, by M. Balland. An analytical table is given, showing the maximum and minimum values of the proximate constituents of oats.—New bile pigments, by MM. A. Dastre and N. Floresco.—Action of the X-rays on the heat radiated by the skin, by M. L. Lecerle. Under the action of the X-rays there is an increase in the radiation of heat from the skin, an increase which frequently persists for some time after the exposure.

## BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—The Founders of Geology: Sir A. Geikie (Macmillan).—Papers printed to commemorate the Incorporation of the University College of Sheffield: The Winter Meteorology of Egypt, and its Influence on Disease: Dr. H. E. L. Canvey (Baillière).—Chemistry for Photographers: C. F. Townsend (Dawbarn).—Memorials of Wm. Cranch Bond and of his Son Geo. Phillips Bond: E. S. Holden (San Francisco, Murdock).—Life-Histories of American Insects: Prof. C. M. Weed (Macmillan).—Tracé d'un Chemin de Fer: A. Dufour (Paris Gauthier-Villars).—Theoretical Mechanics: A. E. H. Love (Cambridge University Press).—A Practical Physiology: Dr. A. F. Blaisdell (Boston, Ginn).—Ostwald's Klassiker der Exakten Wissenschaften, Nrs. 88-91 (Leipzig, Engelmann).—Nights with an Old Gunner: C. J. Cornish (Seeley).—Report of the Commissioner of Education for the Year 1895-96, Vol. 1, Part 1 (Washington).—La Vie Mode de Mouvement: Prof. E. Préaubert (Paris, Alcan).—Wechselstrommessungen und Magnetische Messungen: Dr. C. Heinke (Leipzig, Hirzel).—Notes on Micro-Organisms Pathogenic to Man: Surgeon-Captain B. H. S. Leumann (Longmans).

PAMPHLETS.—Revision of the Tachinidæ of America North of Mexico: D. W. Coquillett (Washington).—Zur Psychologie des Erkennens: Dr. G. Wolf (Leipzig, Engelmann).

SERIALS.—Physical Review, August (Macmillan).—Bibliotheca Geographica herausgegeben von der Gesellschaft für Erdkunde zu Berlin, Band iii. Jahrg. 1894 (Berlin).—Revue de l'Université de Bruxelles, October (Bruxelles).—Bulletin of the American Mathematical Society, October (New York).—Traité Encyclopédique de Photographie: Prof. C. Fabre, deux supplément, B. 1, 2, 3 fasc. (Paris, Gauthier-Villars).—Journal of the Chemical Society, October (Gurney).—Quarterly Review, October (Murray).—Middlesex Hospital Journal, No. 4 (London).—Reliquary and Illustrated Archaeologist, new series, Vol. 3 (Bemrose).—Longman's Magazine, November (Longmans).

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