of its inventors, Mr. C. D. McCourt. The feature of the system is the combustion of the gas and air mixture as it is passing with the requisite velocity through the interstices of a granular refractory material. A steam boiler fired in this way evaporates 16 lbs. of water per hour per square foot of heating surface. The old student notes occupy fifteen pages. Referring to work in the drawing office of a French engineering firm, Mr. K. C. Barnaby writes:—". . . there is the delightful metric system. I cannot imagine anyone who has worked and calculated in a Continental office who would not wish our antiquated system of weights and measures—well, where parallels meet."

THE fifty-seventh annual exhibition of the Royal Photographic Society, which was opened last Monday, will remain open until the 21st inst. at the Gallery of the Royal Society of British Artists, Suffolk Street, Pall Mall. In the scientific and technical sections four exhibits have been awarded medals. The first consists of examples of a new photo-mechanical process by Mr. A. E. Bawtree, who has found a method of transferring the pigment of an impression from an engraved plate, whether it is old or new, to a sheet of glass, so producing a more perfect transparency than any camera method can yield. He claims that not a grain of the pigment is lost. From this transparency copies of the original may be made by various photographic or photo-mechanical methods as is well known. He can then retransfer the pigment from the glass to paper without the loss of even the finest detail. The method of transfer is so easy that the author does not yet describe it, because it enables facsimiles of bank-notes and such documents to be prepared with a very moderate outlay for apparatus. Dr. D. H. Hutchinson's series of photomicrographs of the ova of the Mexican Axolotl show the development of the embryo from the first day after the egg has been laid up to the time of its escape from the egg. This, and Mr. Farren's series of photographs of the little egret, and Mr. G. Busby's autochrome landscape, well deserve the medals that have been awarded them. Among the numerous other exhibits we may perhaps direct special attention to the radiographs of Dr. Hall-Edwards, which show the effect of bismuth salts and iodoform in indicating details with great clearness, Dr. Thurstan Holland's "plastic" radiographs, Dr. T. W. Butcher's high-power photomicrographs, and Dr. Rodman's stereo-photomicrographs of the scales on the wings of moths and butterflies and the hairs on the leaves of plants, though it seems almost invidious to do so where so much good work is shown illustrating many different branches of work.

PARTS ii. and iii. of the Subject List of Works on Mineral Industries in the Library of the Patent Office have just been published at the office, 25 Southampton Buildings, Chancery Lane, W.C., price sixpence each. Part ii. contains classified titles of works on iron manufacture, alloys, and metallography, and part iii. those relating to metallurgy (non-ferrous and general), assaying, and fuel combustion. The lists, like others in the same series, are most helpful guides to the contents of a very valuable library.

OUR ASTRONOMICAL COLUMN.

THE SPECTRUM OF BROOKS'S COMET, 1911c.—Some excellent spectrograms of comet 1911c are reproduced and their special features discussed by MM. de la Baume Pluvinel and Baldet in the September number of *L'Astronomie*. The spectrographs employed were mounted at the Juvisy Observatory, and an examination of the complete series of plates shows very markedly the spectral changes which took place as the comet approached the sun; between August and the end of October a number of "unknown" radiations between λ 4100 and λ 4000 suffered a considerable diminution of intensity as compared with other radiations. The wave-lengths of these lines, considered precise to 1 Å, are 4099, 4074, 4065, 4051, 4041, 4032, and 4016. These radiations were peculiar to the nucleus of the comet, being found neither in the coma nor the tail, and as they became fainter the tail radiations became strong; it was also noted that in the later spectra the tail radiations extended well to the front of the comet's head, showing that in active comets, such as this one and Morehouse's, the tail matter is expelled in all directions. In Kiess's comet it appeared to escape from one point only. Altogether 47 monochromatic images of the nucleus were counted on the Juvisy plates, but the kathode spectrum of nitrogen was not recognised among them.

THE CORONA AT THE TOTAL SOLAR ECLIPSE OF APRIL 17.—A drawing of the corona, made by Señor J. Comas Solá, at Barco de Valdeorras (Galicia), on April 17. appears in No. 4597 of the *Astronomische Nachrichten*. Although observers at other stations were uncertain as to the definite apparition of the corona, Señor Comas Solá saw it well extended, and on his drawing depicts it extending equatorially to about 2½ solar diameters on either side of the sun. The drawing, given principally to show the general form, represents a corona distinctly of the minimum type. The same observer also describes his spectrum observations, while many others give the results of observations of the contacts, &c.

THE DIAMETER OF NEPTUNE.—An interesting paper by Dr. G. Abetti, discussing the various measures of Neptune made since 1846, appears in No. 8, vol. i. (second series), of the *Memorie della Società degli Spettroscopisti Italiani*. He shows that the measured diameter has, in general, tended to become less as the aperture and magnification employed have increased. Using only the results from apertures of more than 40 c.m. and magnifications greater than 620, the mean values being 76 c.m. and 794 respectively, the diameter at unit distance comes out as 69·04″ for the mean aperture, and 68·98″ for the mean power; other considerations show that the true value differs but little from 69″. Using this value, he then calculates the true diameter as 5×10^4 km., the density (earth=1) as 0·29 or (water=1) 1·6, and the superficial gravity as 1·12, that at the earth's equator being taken as 1·0. As seen from the earth, the apparent diameter ranges between 2·39″ and 2·20″.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

BIRMINGHAM.—The University has suffered a severe loss by the death of the Vice-Chancellor, Alderman Charles Gabriel Beale, at the early age of 69. Alderman Beale, who was a graduate of Trinity College, Cambridge, was one of the most prominent citizens of Birmingham, having been elected to the mayoral chair no fewer than four times. He was mainly instrumental in carrying to a successful conclusion the great scheme for supplying the city with water from the Welsh

mountains. He was, from the outset, a most energetic supporter of the movement for establishing a University in Birmingham, and was largely responsible for the working-out of the scheme, for which his legal training and experience qualified him in an unusual degree. When the University became an accomplished fact in 1900, his services to the cause were fittingly recognised by his appointment as the first Vice-Chancellor. His ideas were on a large scale, and he believed in the importance of associating the University with buildings which by their imposing size and appearance should appeal to local patriotism and serve to keep before the inhabitants of a great industrial centre the claims of higher education. Within the University he was known to the undergraduates for his special interest in their social welfare.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, August 26.—M. A. Bassot in the chair.—Edouard **Heckel**: The cultural bud mutation of *Solanum tuberosum*. An account of experiments in the cultivation of wild potato plants from Chile, Bolivia, and Peru. The tubers produced from the cultivated plants were edible, and contained a greater amount of starch than the wild plants. The tubercles from Bolivia showed the characters of mutation; those from other sources appeared to be in course of mutation.—W. H. **Young**: The summability of a function of which the Fourier's series is given.—B. **Bianu** and L. **Wertenstein**: An ionising radiation, attributable to the radio-active recoil, emitted by polonium. It was found to be necessary to use a polonium film in these experiments not exceeding 10$\mu\mu$ in thickness. The curves obtained with a silver disc covered with this thin polonium layer, in presence of a transversal magnetic field of 1100 units, were analogous with those obtained in the case of radium C, and show clearly the existence of an absorbable radiation.—J. **Bougault**: Benzylpyruvic acid. The acid was prepared by the action of alkaline solutions on phenyl-α-oxycrotonamide. The yields of benzylpyruvic acid were good. The condensation products of this acid with itself and with acetone were also studied.—H. **Vincent**: The active immunisation of man against typhoid fever Details of five cases are given which show that inoculations of typhovaccin have a preventive power not only against subsequent absorption of typhoid cultures, but also against a recent infection anterior to the inoculation.—Charles **Nicolle**, L. **Blaizot**, and E. **Conseil**: The conditions of transmission of recurrent fever by the flea. The evidence is against the assumption of hereditary transmission in the flea. Details are given of studies in the necessary conditions for infection.—J. **Wolff**: The stimulating action of alkalies and of ammonia in particular on peroxydase.—P. **Chaussé**: The vitality of the tubercle bacillus tested by inoculation and by inhalation.

BOOKS RECEIVED.

Notes on Algebra. By A. F. van der Heyden. Pp. viii+133. (Middlesbrough: W. Appleyard and Sons, Ltd.) 2*s*. 6*d*.

Exercises in Modern Arithmetic. By H. S. Jones. Pp. x+336. (London: Macmillan and Co., Ltd.) 2*s*. 6*d*.

British Rainfall, 1911. By Dr. H. R. Mill. Pp. 388. (London: E. Stanford, Ltd.) 10*s*.

Life Understood from a Scientific and Religious Point of View, &c. By F. L. Rawson. Pp. xv+660. (London: The Crystal Press, Ltd.) 7*s*. 6*d*. net.

Identification of the Economic Woods of the United States. By Prof. S. J. Record. Pp. vii+117+6 plates. (New York: J. Wiley and Sons; London: Chapman and Hall, Ltd.) 5*s*. 6*d*. net.

Forestry in New England. By Profs. R. C. Hawley and A. F. Hawes. Pp. xv+479. (New York: J. Wiley and Sons; London: Chapman and Hall, Ltd.) 15*s*. net.

Dove Marine Laboratory, Cullercoats, Northumberland. Report for the year ending June 30, 1912. New Series. I. Edited by Prof. A. Meek. (Newcastle-on-Tyne: Cail and Sons.) 5*s*.

Catalogue of the Periodical Publications including the Serial Publications of Societies and Governments in the Library of University College, London. By L. Newcombe. Pp. vii+269. (Oxford: H. Hart.)

Catalogue of the Periodical Publications in the Library of the Royal Society of London. Pp. viii+455. (London: H. Frowde.)

Results of the Magnetical and Meteorological Observations made at the Royal Alfred Observatory, Mauritius, in the year 1902. Pp. xxii+lxxviii+5 plates. Ditto, 1903. Pp. xxi+lxxiv+7 plates. Ditto, 1908. Pp. xxv+lxxxviii+6 plates. (Mauritius.)

An Introduction to the Study of the Protozoa, with special reference to the Parasitic Forms. By Prof. E. A. Minchin. Pp. xi+520. (London: E. Arnold.) 21*s*. net.

Eugenics and Public Health. By Prof. K. Pearson. Pp. 34. (London: Dulau and Co., Ltd.) 1*s*. net.

Darwinism, Medical Progress, and Eugenics. The Cavendish Lecture, 1912. By Prof. K. Pearson. Pp. 29+7 plates. (London: Dulau and Co., Ltd.) 1*s*. net.

Instinct and Experience. By Prof. C. Lloyd Morgan. Pp. xvii+299. (London: Methuen and Co., Ltd.) 5*s*. net.

Lebensbild eines Naturforschers. By E. du Bois-Reymond. Zweite Auflage. Pp. 50. (Brackwede i.W: Dr. W. Breitenbach.) 80 pfennigs.

Grundriss der Biochemie für Studierende und Aerzte. By Prof. C. Oppenheimer. Pp. vii+399. (Leipzig: G. Thieme.) 9 marks.

The Boy's Playbook of Science. By J. H. Pepper. Revised, &c., by Dr. J. Mastin. Pp. x+680. (London: G. Routledge and Sons, Ltd.) 5*s*.

Dana's Manual of Mineralogy. Thirteenth edition. By Prof. W. E. Ford. Pp. viii+460. (New York: J. Wiley and Sons; London: Chapman and Hall, Ltd.) 8*s*. 6*d*. net.

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