

collection of not less than 333,333^l. In this amount may be included the capitalised value of the property mentioned by the Maharaja, and the perpetual grants by three ruling chiefs, provided that the documentary title is satisfactory in the case of the latter, and the possession of the property has been made over in the case of the former. The further conditions are that the constitution of the University should proceed on lines to be indicated by the Government, and that a committee be appointed to report whether the Central Hindu College is fit to be developed into a residential and teaching university.

THE unusual increase in the number of women attending German universities, as shown by statistical returns recently issued in Germany, is of particular interest in view of the fact that women were only admitted as students in the summer of 1905. A note in the issue for July 4 of the Journal of the Royal Society of Arts states that during 1912 the number of women students in German universities has grown from 2795 to 3213, and the percentage of women now in the universities, as compared with the whole student body, is 5.4 per cent., as against 2.7 per cent. three years ago. Of the present body of women students the great majority—2900—come from Germany. Of the foreign women, Russia furnishes more than a third, America about a fourth, and other European countries most of the others. Few women students come from Asia, Africa, or Australia. The University of Berlin alone has more than one-fourth of the total women students of the Empire, the exact number of women in the large universities at present being:—Berlin, 904; Bonn, 289; Munich, 262; Göttingen, 237; Heidelberg, 219; Freiburg, 189; Münster, 172; Breslau, 150; Leipzig, 129; Marburg, 126; Königsberg, 107; Greifswald, 83; Halle, 81; Jena, 65; Strassburg, 52; Kiel, 40; Tübingen, 38; Giessen, 24; Erlangen, 21; Würzburg, 16; Rostock, 6; all others, 3. The departments of study to which the women students give preference are about the same as in former years, the enrolment in certain courses being:—Medicine, 702; mathematics and natural sciences, 579; economics and agriculture, 91; dentistry, 17; and pharmacy, 8.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 26.—Sir Ronald Ross, K.C.B., vice-president, in the chair.—F. S. Phillips: Phosphenescence of mercury vapour after removal of the exciting light.—Dr. G. J. Burch: Light sensations and the theory of forced vibrations.—P. W. Burbidge: The fluctuation in the ionisation due to γ rays.—J. G. Leatham: The force exerted on a magnetic particle by a varying electric field.—Dr. W. Watson: The luminosity curve of a colour-blind observer.—Prof. W. M. Hicks: A critical study of spectral series. Part iii.: The atomic weight term, and its import in the constitution of spectra.—L. C. Martin: A band spectrum attributed to carbon monosulphide. A complex band system occurring in the spectrum of the electric discharge through carbon disulphide vapour in addition to the bands due to sulphur, is also found in the spectrum given by sulphur in the carbon arc. These bands only occur in the presence of both sulphur and carbon, and are probably due to carbon monosulphide.—Igera B. J. Sollas and Prof. W. J. Sollas: The structure of the skull of Dicynodon as revealed by serial sections. The structure of the skull has been demonstrated in a remarkably complete manner by reconstructions built up from serial sections. A single example has afforded nearly all the information which has been slowly accumulated from

numerous specimens during the past half-century and has added the following facts, which are either new or were in need of confirmation:—(1) The vomer is grooved on its dorsal surface; (2) the basis cranii is continued forwards between the orbits as a median vertical plate, which lies in the groove of the vomer, and is itself grooved on the dorsal surface to receive the ventral edge of the mesethmoid; (3) the form of the mesethmoid is such as to suggest that it is an early stage in the formation of a cribriform plate; (4) septo-maxillary bones are present, lying within the internal nares without appearing on the face. They are not connected by suture with neighbouring bones and might easily be lost in fossilisation; (5) the pre-auricular bone is present, situated entirely in front of the pineal foramen and forming its anterior border; (6) a transverse bone exists, clearly marked off from the neighbouring bones by sutures; (7) the root of the tusk, invested by a thin layer of the maxillary bone, lies in a large cavity, to the walls of which the maxillary, lachrymal, jugal, and palatine bones contribute; (8) the sutures separating the pro-otic from neighbouring bones are clearly exhibited; (9) the labyrinth of the ear shows all the three canals with their ampullæ and a long vestibule; (10) the articular surface of the lower jaw is complex, there is a small inner portion which is concave—as in reptiles, and a large outer portion which is convex—as in mammals.

—W. Cramer and R. A. Krause: Carbohydrate-metabolism in its relation to the thyroid gland. The effect of thyroid feeding on the glycogen content of the liver and on the nitrogen distribution in the urine.—Dr. G. W. C. Kaye and D. Ewen: The sublimation of metals at low pressures.—Dr. R. T. Beatty: The energy of Röntgen rays.—Dr. C. Chree: Some phenomena of sun-spots and of terrestrial magnetism. Part ii. The paper is a continuation of one termed for brevity S.M., which appeared in the *Phil. Trans.*, A. 212, p. 75. It is mainly devoted to the question of the existence of a period of approximately twenty-seven days in terrestrial magnetic phenomena. Independent studies of magnetic storms during a very long period of years at Greenwich and Toronto led Mr. Harvey and Mr. Maunder a good many years ago to the conclusion that an interval of about twenty-seven and a quarter days could be recognised between the commencements of successive magnetic storms in a greater number of cases than could reasonably be ascribed to pure chance. S.M. showed that whether one took the daily range of horizontal force at Kew, or the magnetic character of the day, there undoubtedly existed for the epoch 1890 to 1900 a period of twenty-seven days or slightly more, in the sense that if an individual day were highly or moderately disturbed, days twenty-seven or twenty-eight days later were on the average more disturbed than usual. The result was not peculiar to the large disturbances usually termed "magnetic storms," and appeared in all the years examined, whether quiet or disturbed. The present paper finds the same result to hold true of the years 1906 to 1911 when use is made of the magnetic "character" figures which have been published since 1906 at de Bilt, under international auspices. It is also found that the result is as true of quiet as of disturbed characteristics. The paper also investigates whether the phenomena presented by the twenty-seven-day period vary with the period of the year, and what the relationships are, if any, between magnetic "character" and Greenwich measures of sun-spot area and faculæ and Wolfer's sun-spot frequencies. The apparent sun-spot relationships are found to vary a good deal from year to year.—A. Fowler: New series of lines in the spark spectrum of the magnesium. From experiments on the spectrum of the magnesium arc *in vacuo*, it has been

found that there are seven lines which are associated with the well-known spark line 4481.35, their wave-lengths being 3104.91, 2661.00, 2449.68, 2329.68, 2253.94, 2202.75, and 2166.35. The eight lines, taken alternately, fall into two series having their common limit at 4977.6 on the frequency scale. The series are analogous to the two principal series of hydrogen lines, which have recently been investigated by the author.—A. **Fowler** and W. H. **Reynolds**: Additional triplets and other series lines in the spectrum of magnesium. The paper gives particulars of eight new triplets which have been photographed in the ultra-violet spectrum of magnesium, and improved wave-lengths for some of the lines previously recorded. The Rydberg series of single lines has also been extended, and four strong solar lines of previously unknown origin have been identified with lines of this series. Attention is also directed to a probable second subordinate series of single lines. Formulæ representing the various series are given.—W. E. **Curtis**: A new band spectrum associated with helium. The paper describes a new band spectrum observed under certain conditions in vacuum tubes containing helium and hydrogen. The experiments suggest that the bands are due to helium, but until hydrogen can be more completely eliminated their origin cannot be regarded as definitely settled.—Sir W. de W. **Abney** and Dr. W. **Watson**: A case of abnormal trichromatic colour vision due to a shift in the spectrum of the green sensation curve.—Dr. E. F. **Armstrong** and Prof. H. E. **Armstrong**: Studies on the processes operative in solutions (XXX) and on enzyme action (XX). The nature of enzymes and of their action as hydrolytic agents.—Prof. H. E. **Armstrong** and H. W. **Gosney**: Studies of enzyme action. XXI. Lipase. III.—Prof. J. S. **Macdonald**: Studies in the heat production associated with muscular work. Preliminary communication.—Prof. F. **Keeble**, Dr. E. F. **Armstrong**, and W. N. **Jones**: The formation of the Anthocyan pigments of plants. Part vi.—T. **Graham Brown**: The question of fractional activity ("All or None" phenomenon) in mammalian reflex phenomena.—J. H. **Andrew** and Dr. A. **Holt**: The thermal effects produced by heating and cooling palladium in hydrogen.—Hon. R. J. **Strutt**: A peculiar form of low potential discharge in the highest vacua.—A. **Mallock**: Note on copying machinery.—W. **Wahl**: The relation between the crystal-symmetry of the simpler organic compounds and their molecular constitution. Part ii.—G. A. **Shakespeare**: Experiments on the temperature coefficient of a Kew collimator magnet.—W. **Jevons**: Spectroscopic investigations in connection with the active modification of nitrogen. III.: Spectra developed by the tetrachlorides of silicon and titanium.—Lord **Rayleigh**: The passage of waves through fine slits in thin opaque screens.—Prof. W. H. **Bragg**: The reflection of X-rays by crystals. II. In a previous communication (April, 1913) it was shown that the wave-lengths of homogeneous pencils of X-rays could be expressed accurately in terms of the space relations of a crystal. The formula $\lambda = 2d \sin \theta$ connected the wave-length λ with θ , the glancing angle at which the pencil was reflected in the crystal face, and d the distance between parallel reflecting planes. The angle θ could be determined with accuracy, but want of exact knowledge of crystal structure threw difficulties in the way of a complete evaluation of wave-length. W. L. **Bragg**, using two independent methods of research (those of the Laue diagram, and of reflection in the crystal face), has shown that in all probability the value of d is 2.81×10^{-8} cm. From this it follows that the wave-length of the "B peak" is 1.10×10^{-8} . Characteristic radiations having wave-lengths 1.25×10^{-8} and 1.66×10^{-8} are emitted by bulbs having antikathodes of tungsten and nickel

NO. 2280, VOL. 91]

respectively. So far as it has been found possible to measure the absorption coefficients, they belong to rays which are characteristic of the antikathode metals, and the quantum energy—Planck's constant multiplied by frequency—agrees well with the energy of the cathode ray which, according to Whiddington, is required to excite the X-ray, or which the X-ray can excite.—W. L. **Bragg**: The structure of some crystals as indicated by their diffraction of X-rays. An analysis of the Laue diagram of sylvine (KCl) shows that the diffracting centres are arranged on a space-lattice of the simplest cubical form. The diagrams of potassium iodide and bromide show that the diffracting centres are arranged on a lattice the element of which is the face-centred cube. Sodium chloride is an intermediate case. From this and other features of the diagrams, it is concluded that in all these crystals the atoms of metal and halide are arranged in a simple cubic lattice, rows parallel to the axes containing alternate atoms of either kind. In sylvine the equal weights of the atoms render them equally efficient as centres; in KBr and KI the heavy halogen atoms alone act, and so the pattern is characteristic of the face-centred cube lattice. The diagrams of other crystals are discussed in reference to these conclusions. By means of the X-ray spectrometer, described in a previous paper, the dimensions of these lattices can be accurately compared; and the relative magnitudes of the different orders of spectra reflected from any face, and from different crystals, yield information which confirms the above conclusions. It also appears that the weight associated with each point of the lattice is proportional to the molecular weight of the substance. These conclusions yield the necessary information for the accurate calculation of the wave-length of the X-ray.—Leonard **Hill**, J. M. **McQueen**, and W. W. **Ingram**: The resonance of the tissues as a factor in the transmission of the pulse and in blood pressure.—G. F. **Davidson**: Experiments on the flow of viscous fluids through orifices.

Linnean Society, June 19.—Prof. E. B. **Poulton**, president, in the chair.—E. G. **Baker**: African species of the genus *Crotalaria*. Short descriptions are given of the 309 species known to the writer as occurring in Africa. These are arranged in the following groups:—*Simplicifoliæ*, 39; *Sphærocarpæ*, 65; *Chrysocalycinae*, 7; *Farctæ*, 5; *Spinosa*, 3; *Eucrotalaria*, subdivision *Grandifloræ*, 29; subdivision *Medio-crifloræ*, 61; subdivision *Parifloræ*, 49; subdivision *Oliganthæ*, 33; subdivision *Stipulosæ*, 18. The genus *Crotalaria* is allied to *Lotononis*, and it is generally easily distinguishable by the rostrate carina.—Dr. W. T. **Calman**: *Aphareocaris*, nom. nov. (*Aphareus*, Paulson), a genus of the Crustacean family *Sergestidae*.—Dr. Agnes **Arber**: An anatomical study of the cone-genus *Lepidostrobos*.—G. H. **Wailles**: Fresh-water Rhizopoda from North and South America. During the year 1912 gatherings from the States of New York, New Jersey, and Virginia provided records of twenty-four species and varieties of Rhizopoda, in addition to those enumerated in the paper read before the society in April, 1911. A number of gatherings received from Mr. James Murray and collected by him from various places on the east and west coasts of South America were examined, and provided records of seventy-five species and varieties of Rhizopoda, including three now described for the first time.—C. **Bucknall**: A revision of the genus *Symphytum*.—S. **Kemp**: Pelagic Crustacea Decapoda of the Percy Sladen Expedition in H.M.S. *Sealark*.

PARIS.

Academy of Sciences, June 30.—M. P. **Appell** in the chair.—Paul **Sabatier** and M. **Murat**: The preparation

of several diphenylpentanes and some corresponding dicyclohexylpentanes. Three of the eighteen possible isomeric diphenylpentanes have been prepared, and these have been transformed by direct addition of hydrogen in presence of nickel into the corresponding dicyclohexylpentanes, the physical constants of the latter being given.—M. de **Forcrand**: The hydrates of uranic anhydride and the heat of formation of uranyl nitrate.—R. **Lépine** and M. **Boulud**: The diminution in chlorides in urine secreted under pressure. Additional experiments confirming results published in previous papers.—M. **Arnaud**: Astronomical refraction under any angle whatever. In a previous communication a formula for refraction was given and the integration solved for the particular case of horizontal refraction. In the present paper this is extended, and practical formulæ deduced giving an accuracy of 0.1%.—A. **Korn**: Integral equations with asymmetrical nucleus.—Ed. **Sarasin** and Th. **Tommasina**: A new study of the Volta effect made with the aid of the induced radio-activity.—Pierre **Weiss**: The magnetic fields obtained with an electromagnet furnished with ferro-cobalt pole-pieces. By the use of ferro-cobalt pole-pieces in place of soft iron an increase of about 5 per cent. in the strength of the magnetic field is obtained, the ampere turns remaining constant.—C. **Chéneveau**: The optical properties of water and its physical constitution. The variations in the optical constants of water with temperature are in agreement with the hypothesis that liquid water is a mixture of two isomers, in proportion varying with the temperature, and possessing properties depending only slightly or not at all on the temperature.—M. **Guéritot**: A thermo-electric manoscope of great sensibility. A portion of the air in a tube connecting two reservoirs is continuously heated near a bend constituting the highest point of the system. The slightest motion of this heated air is shown by a thermocouple; a displacement of gas amounting to only a tenth of a cubic millimetre is shown. Various applications of the apparatus are indicated.—Keivin **Burns**: A displacement of the lines of the spectra of certain metals produced by the presence of another metallic vapour. The cases of barium in an iron arc, manganese in an iron arc, and cadmium in a mercury arc have been studied, and it has been found that the lines of the metal present in small proportion are displaced by the vapour of the predominating metal (iron, mercury). This effect may account for some differences proved to exist between wave-lengths found in the arc and in the sun.—L. **Gay**: Adiabatic expansion in liquids. Data are given for the coefficient of adiabatic compressibility of eight liquids at 0° C. and at room temperatures.—Victor **Henri**: Chemical lability and absorption of the ultra-violet rays. Experimental results are cited in support of the proposition that bodies of which the molecules are labile, or which enter easily into reactions, absorb the ultra-violet rays strongly.—Witold **Broniewski**: The thermo-electricity of steel. It is shown that the thermoelectromotive force may give indications of the critical points of steels with equal or higher precision than the other methods in current use.—N. D. **Costeanu**: The action of carbon dioxide upon mineral sulphides. The sulphides of silver, copper, cadmium, bismuth, and antimony undergo no change when heated in a current of carbon dioxide; silicon sulphide gives carbon monoxide, sulphur, and silica under the same conditions.—P. **Lebeau** and A. **Damiens**: The composition of the gaseous mixtures resulting from the action of water upon the carbides of uranium and thorium. The method previously described by the authors for the analysis of complicated hydrocarbon mixtures, based on the use of low temperatures, has been applied to the analysis of the gases arising from

the decomposition of uranium and thorium carbides by water. Five complete analyses are given.—Daniel **Berthelot** and Henry **Gaudechon**: The preparation of carbon oxycyanide. This substance is produced by the action of the silent discharge on a mixture of carbon monoxide and cyanogen.—André **Meyer**: The azoic colouring matters derived from phenylisoxazolone.—Léo **Vignon**: The composition of water-gas. A small proportion of methane appears to be normally present in water-gas; the amount of this gas is shown to increase with the amount of lime present in the coke.—J. **Clarens**: The existence of bromites. Evidence is adduced in support of the existence of a bromite in a solution of a hypobromite which has been heated for a short time to 80° C.—L. **Daniel** and J. **Delpon**: A grafted hybrid between the peach and the almond.—P. **Choux**: The genus *Baseonema* at Madagascar.—H. **Devaux**: The pressure of the air in the lacunæ of aquatic plants. The pressure of the internal atmosphere of an aquatic plant when submerged is equal to that of the dissolved gases.—M. **Wilmet**: The okapi. Study of an okapi kept in captivity for one month.—J. **Bounhiol**: New observations on the reproduction of the Algerian sardine.—H. **Bierry** and Mlle. **Lucie Fandard**: Variations of glycemia during inanition.—E. **Gley** and Alf. **Quinquaud**: The action of thyroid extract on the super-nal secretion.—R. **Robinson**: The genital glands and the dental system.—Albert **Robin**: Researches on the variations of phosphoric acid in the urine and liver of cancer subjects.—J. **Ville** and E. **Derrien**: Biochemical catalysis of a luminescent oxidation.—F. **Jadin** and A. **Astruc**: Arsenic and manganese in young and old leaves.—Pierre **Thomas**: The proteid substances of yeast. The albumenoid material derived from yeast is shown to be intermediate in properties between casein and egg albumen. It is provisionally named cerevisine.—Gabriel **Bertrand** and H. **Agulhon**: The presence of boron in milk and in eggs. The milk from four animals and eggs from five species of birds were proved to contain boron.—H. **Pottevin** and H. **Violle**: The comma bacillus and its toxins.—Alphonse **Berget**: A simplified barometric formula for the determination of heights. The formula proposed is $Z = D(t + 269)/h$, in which Z is the difference of height, D the difference of pressures read on the barometer at the two stations, h the mean barometric pressure, and t the mean temperature. For heights below 3000 metres the agreement between this arithmetical formula and the usual logarithmic expression is shown by examples to be very close.

BOOKS RECEIVED.

Clinical Surgical Diagnosis for Students and Practitioners. By Prof. F. de Quervain. Translated by Dr. J. Snowman. Pp. xv+779. (London: J. Bale, Ltd.) 25s. net.

Report on the Progress of Agriculture in India for 1911-12. Pp. 65. (Calcutta: Superintendent Government Printing, India.)

Western Australia. Geological Survey. Bulletin No. 42. Contributions to the Study of the Geology and Ore Deposits of Kalgoorlie. E. Coolgardie Goldfield. Part I. By E. S. Simpson and C. G. Gibson. Pp. 198+49 plates+2 maps. (Perth, Western Australia: F. W. Simpson.)

Bureau des Longitudes. Conférence Internationale de l'Heure (Paris, Octobre, 1912). Pp. 282. (Paris: Gauthier-Villars.)

Mysore Government. Meteorological Department. Report on Rainfall Registration in Mysore for 1911. By N. V. Iyengar. Pp. xvi+49+plates. (Bangalore: Government Press.)