object: to examine the light from the sun's edges, at and near the annular period, in order to ascertain whether the dark lines in the spectrum were more numerous or stronger in the light which must have traversed the greatest thickness of the sun's atmosphere, and which have been supposed by Sir D. Brewster and others to be due to the absorptive action of that atmosphere. An attentive examination assures me that no material difference could exist; indeed, I did not perceive the slightest." Writing to Miss Forbes four days later, he said: "The eclipse was admirably seen here, and seemed to strike every sort of person much more than expected. I was making optical experiments in a dark room most of the time, but ran out for half a minute to see the ring, which was a wonderful sight. I sent you an account in the *Advertiser*. Dr. Chalmers preached, and I managed to hear him, too. Evening service was postponed in the churches and chapels, except Mr. Bagot's, and the smoking of glass and the burning of fingers and blacking of faces was wonderful. . . ."

Glass Balance-Springs in Chronometers

AT a meeting of the Royal Society held on May 19, 1836, Captain F. Beaufort, R.N., communicated a paper by Arnold and Dent "On the Application of Glass as a substitute for metal balance-springs in Chronometers". In their endeavour to determine and reduce the errors arising from the expansion and contraction of balance-springs in chronometers due to the variations in temperature, glass had been suggested as possessing desirable qualities. It was found that a glass balance-spring would resist the effect of cold, and by experiments made on board H.M.S. *Excellent* at Portsmouth that it would withstand the shock arising from the discharge of cannon in the vicinity. "On comparing the performance of glass balance-springs with metallic ones when the temperature was raised from 32° to 100°, it was found that while the loss in twenty-four hours in the gold springs was 8 m. 4 s., that of steel 6 m. 25 s. and that of palladium 2 m. 21 s., that of a glass spring was only 40 s." Chronometers with glass balance-springs were being tested at the Royal Observatory.

Death after Flogging

THE *Gazette des hôpitaux* of May 20, 1836, contains the following report: "A jury met at the King's Head Tavern, Woolwich, to inquire into the death of a sailor named William Saundry who died after being flogged. According to the coroner, the case required much consideration, as it had to be decided whether death was the result of a military punishment or of some disease. Death had occurred ten days after the flogging. The autopsy ordered by the coroner took place in the presence of ten doctors who decided that death was the result of fever and not of the flogging. Eight of the jury maintained that death would not have taken place without the flogging, but nine of the others agreed with the opinion of the doctors. The following verdict was given: 'William Saundry died by the visitation of God, and not by the hand of a person of any kind'. On reading a report of this case, it is difficult to say which is the most astounding: the contradictions in the report, the intense partiality of the doctors or the existence of so barbarous a punishment in a country so highly placed in the scale of civilisation as England."

Societies and Academies

LONDON

Royal Society, May 7. P. M. S. BLACKETT: Measurement of the energy of cosmic rays. (1). The electro-magnet and cloud chamber. An electro-magnet weighing about 11,000 kgm. has been constructed for the purpose of measuring the energy of cosmic rays and for studying the cosmic ray showers. The magnet gives a field of 14,000 gauss in a gap of 15 cm. between pole pieces 25 cm. in diameter for a power of 25 kw. The coils are air-cooled using a 4 h.p. fan. A special cloud chamber, 27 cm. in diameter by 3 cm. deep, is placed between the pole pieces. Two different optical systems are used, one employing a mirror and a camera at the side, and the other employing a stereo-camera photographing through a hole in one pole piece. The various arrangements of gap and optical system are compared from the point of view of measuring cosmic rays of the greatest possible energy. P. M. S. BLACKETT and R. B. BRODE: The measurement of the energy of cosmic rays. (2). The curvature measurements and the energy spectrum. The measurement of the energies depends on the measurement of very small curvatures. The method of making these measurements is described. Measurements of 180 cosmic ray tracks are given. The highest detectable energy with tracks 17 cm. long in 14,000 gauss is 2×10^{10} e.v. The energy spectrum between 10^9 and 10^{10} e.v. is shown to be approximately of the form $g(E) \propto E^{-2}$; in this range of energies about equal numbers of positive and negative particles are found. The particles over 10^{10} e.v. are mainly positive. W. EHRENBERG: The connexion between cosmic ray showers. Cosmic ray showers have so far been investigated chiefly by counting the number of triple coincidences of suitably arranged Geiger-Müller counters. The information obtained in this way is restricted to the number of these events. To obtain more complete information on showers, an ionisation chamber was put above the counters in the experiments described, and the ionisation in the chamber was recorded whenever all three counters were operated simultaneously. This ionisation is due to the shower particles traversing the chamber, and the number of ions produced is proportional to the number of particles in the shower. The number of particles in showers obtained under different conditions varies between 3 and 1,200. With lead above the chamber the rate of occurrence R of showers of N particles decreases rapidly with N, following approximately a law $R = N^{-s}$ where s lies between 2·2 and 3·1. It is concluded that all 'bursts' are nothing else than showers measured by the ionisation they produce. D. H. FOLLETT and J. D. CRAWSHAW: Cosmic ray measurements under thirty metres of clay. The zenith angle distribution of cosmic ray intensity in a north-south plane was determined at ground-level and in Holborn Underground station. At this level the vertical intensity was approximately 1/20 that at ground level. The shape of the distribution curve is the same at the two levels. This leads to the conclusion that the intensity of cosmic radiation varies as a power of the path length in an absorber, rather than exponentially; and the shape of the curve gives the value -2 for this power. Using five counters, so arranged that at least three particles arriving simultaneously are required to discharge all five at once, the presence of showers in the Underground station was proved. Rough

transition curves were taken, at that level and at ground-level; they had approximately the same shape, with a maximum at the neighbourhood of 1·6 cm. of lead. The ratio of shower frequency to vertical intensity is apparently not very different at the two levels (see also NATURE, Dec. 28, 1935, p. 1026).

PARIS

Academy of Sciences, April 6 (*C.R.*, **202**, 1225–1316). EMILE JOUGUET: The waves of shock produced in a gas by a solid explosive. ARMAND DE GRAMONT and DANIEL BERETZKI: The generation of acoustic waves by means of piezo-electric quartz. Description of arrangements by means of which vibrating quartz plates can be made to give a range of 50–30,000 periods per second. LOUIS ROY: Remarks on the new Giorgi system of units. A. DEMOULIN: The curvature of congruences of spheres. PIERRE RACHEVSKY: Trimetric systems and the generalised Finsler metric. CASIMIR KURATOWSKI: A problem concerning transfinite induction. STÉFAN KEMPISTY: The Denjoy-Stieltjes integral of a function of two variables. EUGÈNE LEIMANIS: The singular points of differential equations. I. PETROWSKY: A problem of Cauchy for a linear system of partial differential equations in a real domain. BÉLA de SZ. NAGY: The invariant measurement in topological groups. LEONIDAS KANTOROVITCH: The general forms of the linear operations which transform some classic spaces into an arbitrary linear semi-ordinate space. LÉOPOLD ESCANDE and GEORGES SABATHE: Experiments on piers of weirs with aerodynamic profile and zero contractions. EDMOND BRUN, MARCEL JAMPY and ROBERT LECARDONNEL: The thermal exchanges between a heated body and the air when the body has a high velocity with respect to the fluid. BERNARD LYOT: The solar corona in 1935. Results of observations, direct and spectroscopic, made at the Pic du Midi during August and September, 1935. PIERRE SALET: The kinetic energy of the stars. G. FOURNIER: Some seasonal phenomena presented by the planet Mars during 1935. JACQUES WINTER: The polarisation of Dirac waves. RENÉ PLANIOL: The production of intense bundles of slow electrons. PIERRE JOLIBOIS and FRANCOIS OLMER: The synthesis of ammonia by cathodic pulverisation of lead. Catalysis by cathodic projection establishes equilibrium of such a system as N_2+3H_2 at very low temperatures (38°–118° C.) compared with those required in the absence of catalysts. L. NÉEL: An attempt at the interpretation of the saturation moment of ferromagnetic metals. MAURICE DÉSIRANT and ANDRÉ MINNE: The bands of fluctuations of tellurium vapour. SALOMON ROSENBLUM, MARCEL GUILLOT and MLLE. MARGUERITE PEREY: The intensity of the groups of fine structure of the α-magnetic spectra of radioactinium and its descendants. LOUIS DOMANGE: The equilibria of some metallic fluorides with steam. Experimental data obtained with the fluorides of ten metals. C. DEGARD: Study of the structure of the molecule of nitromethane by diffraction of electronic rays in the vapour. JEAN LOUIS DELSAL: The polarimetric study of nickel malate. MLADEN PAIĆ and MLLE. VALERIE DEUTSCH: The adsorption of proteins. The influence of the hydrogen ion concentration on the adsorption of hæmoglobin by kaolin. FRANCOIS PUCHE: Barium chlorosmate. Preparation, properties and thermal dissociation of $BaOsCl_6$. ROBERT TRUFFAULT: The condensation of benzene with unsaturated hydrocarbons and with their halogen derivatives in the presence of acid catalysts. Allyl chloride and benzene, in the presence of concentrated acid as catalyst, react to give β-chlorisopropyl benzene. PANOS GRAMMATICAKIS: The action of organo-magnesium compounds on the phenylhydrazones. Method of preparation of the symmetrical alkylphenylhydrazines. ALBERT ROBAUX: The presence of the upper Cretaceous in the Palæozoic of the Betic of Malaga (Andalusia). LOUIS LONGCHAMBON: The bituminous schists of Fécocourt. PIERRE DANGEARD: The somatic nuclear division in *Arum italicum*. LUC ALABOUVETTE, LÉONIDE FRIEDBERG and PIERRE BERGAL: Some utilisable characters for the separation of pedigree kinds of two-rowed barley, *Hordeum distichum*. JEAN GRYNFELTT: The crystalloids of the mammary gland. J. GAUTRELET, D. BROUN, H. SCHEINER and EL. CORTEGGIANI: The characterisation of sympathico and parasympathicomimetic substances in blood by dialysis *in vivo*. RAOUL LECOQ: Production of bird polyneuritis by means of diets rich in glucides, proteins and lipids, including large doses of B vitamins by simple addition of lactic acid. The addition of 10 per cent of lactic acid prevents the pigeon utilising vitamin B, even when the latter is present in high proportions. ANTOINE JULLIEN and MME. HÉLÈNE VAIREL-BLANC: The relations between the automatic activity of the heart and the structure of the organ in the snail. MME. ANDRÉE DRILHON and E. A. PORA: Ionisation and buffers of the internal medium of the crab (*Carcinus mœnas*) with parasite (*Sacculina*). MAURICE FONTAINE: The complete maturing of the genital organs of the male eel and the spontaneous emission of its sexual products. MICHEL CIUCA, MME. LYDIA MESROBEANU and GEORGES BADENSKI: Microbial variants of the Aertrycke bacillus and possible variability in the chemical constitution of the complete somatic antigen of this germ.

ROME

Royal National Academy of the Lincei (*Atti*, **22**, 367–472; 1935). M. BETTI and E. LUCCHI: Anomalies in the dissociation constants of some halogenated organic acids (3). The dissociation constants of *o*-chloro- and *o*-bromocinnamic acids (*trans*) are equal ($0·39 \times 10^{-4}$). F. SACCO: Transversal tectonic lines of the Appennines (1). R. CACCIOPPOLI: (*1*) Elliptical partial differential equations with two independent variables, and regular problems of the calculus of variations (ii). (2) Conformable representation and quadrable surfaces. G. SCORZA DRAGONI: Concerning a theorem of Golomb on non-linear integral equations. B. SEGRE: (1) Curvilinear elements which have common origins and relative spaces meeting at a point. (2) Projective lines and an immersion invariant of a curve on a surface. E. GUGINO: Relativistic problem of motion in a stationary gravitational field. L. SONA: Translo-circulatory current which invests a bilateral lamina. Dynamic forces (4). G. BISCONCINI: On the so-called gyroscopic phenomena. L. USLENGHI: Motion of a point source in a concave angle. A. MASOTTI: (1) Centre of asymptotic motion. (2) Planar motions in presence of particular systems of vortex-sources. S. FRANCHETTI: Liquid state and interatomic forces (1). G. B. BONINO and R. MANZONI-ANSIDEI: Raman spectrum and constitution of pyrazole and of some of its derivatives. The spectrum of pyrazole contains eleven lines, similar to those of thiophen and of pyrrole, but there are no lines characteristic

of the double-bond. R. MANZONI-ANSIDEI: Raman spectrum of dimethylfurazan and of dimethyloxdiazole. G. B. BONINO, R. MANZONI-ANSIDEI and D. DINELLI: Raman spectrum of some substituted pyrrole aldehydes. These all have an intense, diffuse line at 1,620–1,650 cm.$^{-1}$ due to the strongly perturbed C=O group, and a line at 1,560–1,570 cm.$^{-1}$, which is probably due to a double bond. A. MANGINI: Condensation products of oximes with aromatic diazo compounds. A. ORRÙ: Behaviour of the electrical conductivity of hen's egg yolk at increasing and decreasing temperatures. There is no hysteresis phenomenon in the case of egg yolk. D. DINELLI: Colouring substances in the shell of cassowary eggs. M. FIORE: Presence of *Wielandiella angustifolia*, Nath., in Veronese Lias (Roverè di Velo). F. RODOLICO: Chemical composition of the eruptive rock of Cupaello (Rieti).

Forthcoming Events

[*Meetings marked with an asterisk are open to the public.*]

Monday, May 18

VICTORIA INSTITUTE, at 5.—Sir Ambrose Fleming, F.R.S.: "Some Philosophical Conceptions of Modern Physical Science and their Relation to Religious Thought". (Presidential Address.)

UNIVERSITY COLLEGE HOSPITAL MEDICAL SCHOOL, at 5.30.—Dr. H. M. Traquiar: "Perimetry" (succeeding lecture on May 19).*

KING'S COLLEGE, LONDON, at 5.30.—Dr. Max Born: "Solved and Unsolved Problems of Mathematical Physics" (succeeding lectures on May 19 and 20).*

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Dr. N. A. Mackintosh: "The Third Commission of R.R.S. *Discovery II*".

Tuesday, May 19

ROYAL SOCIETY OF ARTS, at 4.30.—Prof. J. W. Munro: "Insect Damage to Empire Products".

INSTITUTE OF PATHOLOGY AND RESEARCH, ST. MARY'S HOSPITAL, LONDON, at 5.—Prof. J. L. Witts: "The Paroxysmal Hæmoglobinurias".

UNIVERSITY COLLEGE, LONDON, at 5.30.—Prof. Ernst Cassirer: "Leibniz and Newton: a Comparative Study of the Method of Science and Metaphysics" (succeeding lecture on May 21).*

Wednesday, May 20

CONWAY HALL, RED LION SQUARE, W.C.1, at 7.—Prof. Lancelot Hogben: "The Retreat from Reason" (Conway Memorial Lecture).*

Thursday, May 21

UNIVERSITY COLLEGE, LONDON, at 5.30.—Dr. Alfred Adler: "Some Recent Developments in Individual Psychology".*

ROYAL AERONAUTICAL SOCIETY.—(at the Science Museum, South Kensington, S.W.7).—D. R. Pye: "Slippery Surfaces" (Wilbur Wright Memorial Lecture).

Friday, May 22

ASSOCIATION OF SCIENTIFIC WORKERS, at 8.—(at University College, London, W.C.1).—Public meeting on "Utilisation of Science".*

ROYAL INSTITUTION, at 9.—Prof. E. N. da C. Andrade, F.R.S.: "Whirlpools and Vortices".

Official Publications Received

Great Britain and Ireland

Reports of the Council and Auditors of the Zoological Society of London, for the Year 1935, prepared for the Annual General Meeting to be held on Wednesday, April 29th, 1936. Pp. 119. (London: Zoological Society of London.) [154

University College, Southampton. Avon Biological Research: Annual Report, 1934–35. Pp. 126+3 plates. (Southampton: University College.) 2*s.* 6*d.* [154

University Grants Committee. Report for the Period 1929–30 to 1934–35, including Returns from Universities and University Colleges in receipt of Treasury Grant for Academic Year 1934–35. Pp. 84. (London: H.M. Stationery Office.) 4*s.* net. [164

Sixth Report on the Heterogeneity of Steel Ingots: Discussion, Correspondence and Committee's Reply. Reported by a Joint Committee of the Iron and Steel Institute and the British Iron and Steel Federation to the Iron and Steel Industrial Research Council. (Special Report No. 9A: Supplement to Special Report No. 9.) Pp. ii+70. (London: Iron and Steel Institute.) [164

Waste-Heat Boilers in Open-Hearth Practice: Discussion, Correspondence and Committee's Reply. Second Report of the Open-Hearth Committee, being a Committee of the Iron and Steel Industrial Research Council. (Special Report No. 10A: Supplement to Special Report No. 10.) Pp. ii+63. (London: Iron and Steel Institute.) [174

Ministry of Health. International Agreement Brussels, 1924: Venereal Diseases. Centres in the Ports at Home and Abroad where Seamen can obtain Treatment. (List 7a, revised.) Pp. 25. (London: H.M. Stationery Office.) 6*d.* net. [174

Other Countries

Beiträge zur Mineralogie von Japan. Begründet von T. Wada. Neue Folge, 1. Herausgegeben von T. Ito. Pp. vii+xviii+259. (Tokyo: Imperial University.) [204

Commonwealth of Australia: Council for Scientific and Industrial Research. Bulletin No. 94: Fertility in Sheep; Artificial Production of Seminal Ejaculation and the Characters of the Spermatozoa contained Therein. By Dr. R. M. C. Gunn. Pp. 116. Bulletin No. 95 (Radio Research Board Report No. 9): 1. A Study of the Magneto-Ionic Theory of Wave Propagation by means of Conformal Representation, b Dr. V. A. Bailey; 2. Dispersion and Absorption Curves for Radio Wave Propagation in the Ionosphere according to the Magneto-Ionic Theory, by Dr. D. F. Martyn; 3. A Temperature Compensated Dynatron Oscillator of High Frequency Stability, by J. H. Piddington; 4. The Amplification of Programme Transients in Radio Receivers, by Dr. Geoffrey Builder; 5. A Multi-Range, Push-Pull, Thermionic Voltmeter, by Dr. Geoffrey Builder; 6. The Graphical Solution of Simple Parallel-Tuned Circuits, by Dr. Geoffrey Builder; 7. An Electrical Harmonic Analyser of the Fundamental Suppression Type, by J. H. Piddington. Pp. 71. Pamphlet No. 61: A Discussion of Special Tests on the Compressive Strength of Green Karri (*Eucalyptus diversicolor*). By Ian Langlands. (Division of Forest Products, Technical Paper No. 19.) Pp. 31. (Melbourne: Government Printer.) [204

Zoologica. Vol. 21, Part 1, Nos. 1 and 2: The Reproductive Habits of the North American Sunfishes (Family Centrarchidae), by C. M. Breder, Jr.; Polychaetous Annelids from the Vicinity of Nonsuch Island, Bermuda, by A. L. Treadwell. Pp. 68+10 plates. (New York: New York Zoological Society.) [204

The Imperial College of Tropical Agriculture. The Principal's Report for the Year 1934–35 and the Accounts for the Year ended August 31, 1935. Pp. 34. (Trinidad and London: Imperial College of Tropical Agriculture.) [234

Field Museum of Natural History. Report Series, Vol. 10, No. 3: Annual Report of the Director to the Board of Trustees for the Year 1935. (Publication 354.) Pp. 281–416+plates 25–36. (Chicago: Field Museum of Natural History.) 1 dollar. [244

University of Nebraska: Conservation Department of the Conservation and Survey Division. Bulletin 12: Relative Efficiency of Roots and Tops of Plants in protecting the Soil from Erosion. By Joseph Kramer and Prof. J. E. Weaver. (Contribution from the Department of Botany, No. 99.) Pp. 94. (Lincoln, Nebr.: University of Nebraska.) [244

Mémoires du Musée Royal d'Histoire Naturelle de Belgique. No. 68: A Monograph of the Belgian Cretaceous Echinoids. By Jerome S. Smiser. Pp. 98+9 plates. No. 71: Die Plistozaenen Baeren Belgiens. Teil 2: Die Baeren vom "Trou du Sureau" (Montaigle). Von Prof. Dr. Kurt Ehrenberg. Pp. 97+6 plates. No. 73: La faune et l'âge des quartzophyllades siegeniens de Longlier. Par Eug. Maillieux. Pp. 141+3 plates. Deuxième Série, Fasc. 1: Étude systématique du genre Lepocinclis Perty. Par Dr. W. Conrad. Pp. 85. Deuxième Série, Fasc. 2: Hydraires calyptoblastiques des Indes occidentales. Par Dr. Eugène Leloup. Pp. 73. (Bruxelles: Musée Royal d'Histoire Naturelle de Belgique.) [244

American Philosophical Society. Library: Annual Report for 1935. Pp. 18. (Philadelphia: American Philosophical Society.) [274

Rensselaer Polytechnic Institute Bulletin. Engineering and Science Series, No. 52: The Dielectric Constant of Mineral Powders. By Joseph L. Rosenholtz and Dudley T. Smith. Pp. 11. (Troy, N.Y.: Rensselaer Polytechnic Institute.) [274

Commonwealth of Australia: Council for Scientific and Industrial Research. Bulletin No. 96: Observations on *Myxomatosis Cuniculi* (Sanarelli) made with a view to the use of the Virus in the Control of Rabbit Plagues. By Sir Charles J. Martin. Pp. 28. (Melbourne: Government Printer.) [274

Sixteenth Annual Report of the Research Council of Alberta, 1935. (Report No. 33.) Pp. 44+5 plates. (Edmonton, Alba.: Research Council of Alberta.) 35 cents. [274

Report of the Aeronautical Research Institute, Tôkyô Imperial University. No. 137: Boundary Interference of Partially Closed Wind Tunnels. By Kazuo Kondo. Pp. 162–190. (Tôkyô: Kôgyô Tosho Kabushiki Kaisha.) 30 sen. [284