

Societies and Academies.

LONDON.

Optical Society, Nov. 8.—T. Smith: (1) On systems of plane reflecting surfaces. An algebraic method is evolved of finding the co-ordinates of the image of any point and of the direction of the emergent portion of any given incident ray after reflection at any number of plane reflecting surfaces. Systems of reflectors are classified according to the nature of the self-conjugate region of the field. A method of designing a system having any assigned properties is described. Suitable criteria are given to determine whether with a prismatic system the whole is non-dispersive, and whether total internal reflection takes place at any given surface; also the boundary conditions at each surface are found. The calculations are simple and free from any ambiguity of sign.—(2) Reflecting systems for image inversion. The above method is applied to an inverting prism. Four surfaces involve oblique refraction into the prism whatever the number and order of the reflections. With five surfaces one form is possible with four reflections. All possible arrangements with six reflections at five surfaces are considered, and the application of the method to prisms with a greater number of reflections is illustrated.—L. C. Martin and T. C. Richards: The relations between field illumination and the optimum visual field for observational instruments. Experiments based on the application of the results of recent studies on *spatial induction* in vision to determine the conditions governing the optimum size of visual field under certain conditions are described. The results have a bearing on recent efforts to enlarge greatly the fields of view of binoculars, indicating that small fields are better under certain conditions.

Linnean Society, Nov. 15.—H. Hamshaw Thomas: Further observations on the cuticle structure of Mesozoic Cycadean fronds. The typical members of the genus *Pterophyllum* are widely different in their epidermal structure from the fronds which have often been placed with them as the section Anomozamites. The rare Yorkshire plant *Pterophyllum Nathorsti*, on its cuticle structure, should be regarded as the type of a new genus. There is no justification for the separation of the numerous forms of *Pterophyllum* from the Lunz Beds (Upper Trias) of Austria into a number of species distinguishable by their dimensions. Cuticle structure indicates that the Palaeozoic fronds from the Coal Measures of Blanz and Commentry in France are more closely allied to the Mesozoic genus *Nilssonina*, and cannot be classed as true *Pterophyllums*.—A. H. Clark: On some recent crinoids in the collection of the British Museum.—C. A. Nilsson-Cantell: New and interesting species of *Scalpellum* from a telegraph cable near the coast of North Chile. Four species (two of them new) of barnacles of the genus *Scalpellum* obtained at a depth of 343-400 fathoms are described.—W. M. Tattersall: *Asellus cavaticus* Schiodte, a blind isopod new to the British fauna, from a well in Hampshire. Though new to the British fauna, it is rather widely distributed in subterranean waters in France, Germany, and possibly Switzerland. It is a typical cavernicolous species without eyes and without any trace of pigment. It must have been isolated in England at least since early Tertiary times, yet has apparently remained unchanged during that long period of isolation, probably as the result of the very uniform conditions obtaining in underground waters.

Royal Meteorological Society, Nov. 21.—F. J. W. Whipple: On the association of the diurnal variation of electric potential gradient in fine weather and the

distribution of thunderstorms over the globe. It has been suggested by C. T. R. Wilson that the connexion between the upward currents produced by thunderstorms and the downward currents elsewhere is via the Heaviside layer. Storms are least frequent from 2h. to 4h. G.M.T. (when it is afternoon over the Pacific) and most frequent between 14h. and 20h. G.M.T. (afternoon hours for Africa and S. America). Observations of potential gradient in polar regions and at sea, *i.e.* in parts of the world where there is likely to be little systematic variation in the conductivity of the air, indicate that the gradient has its minimum and maximum values within these same hours. The results are consistent with the Wilson hypothesis.—N. K. Johnson: Atmospheric oscillations shown by the microbarograph. The microbarograph invented by Sir Napier Shaw and the late Mr. W. H. Dines frequently gives a regular wave-like record representing oscillations of atmospheric pressure with periods ranging from about 6 minutes to an hour, with a marked maximum for a period of about ten minutes. These oscillations originate at the interface of two air currents possessing different densities and motions. The natural period of vertical oscillation of the atmosphere is connected with the lapse rate of temperature, and the most frequent period of oscillation recorded corresponds with the most frequent lapse rate.

EDINBURGH.

Royal Society, Nov. 5.—J. R. Thompson: The general expression for boundary conditions and the limits of correlation. The study of correlated variables suggests a complex array of factors, among which it is required to state the highest degree of generality we are compelled to assume and yet retain the possibility of producing a given set of correlations. This purpose is served by the boundary conditions, which can be expressed in general by a determinant of the correlation coefficients and one parameter k , the latter taking the value $-1, -2, -3$, etc., respectively according as the 1st, 2nd, 3rd, etc., boundary condition is required. When $k = +1$ the determinant gives a condition stated by J. C. Maxwell Garnett (*Proc. Roy. Soc.*, 1919) as indicating the presence of two general factors in three variables and three general factors in four variables. Agreement between these results and the boundary conditions is established by a definition of Maxwell Garnett's general factor in terms of ultimate elements.—John Mackie: Mathematical consequences of certain theories of mental ability. On the supposition that four mental abilities are due to N variable factors, and that the proportions in which they act are determined by chance, the probable value of the tetrad-difference F is calculated. Following the geometrical treatment employed by Maxwell Garnett, we find that if N is large, σ_F is approximately inversely proportional to \sqrt{N} , so that by supposing N to be large we get σ_F to be small. The various abilities are represented by directed lines in N -dimensional space, and by considering all possible lines and taking any four at random, we obtain as a probable result $F = O \pm$ a small quantity.—T. P. Black: Mental measurement: The probable error of some boundary conditions in diagnosing the presence of group and general factors. J. Ridley Thompson, by examining correlation coefficients, has developed criteria for testing whether in mental activities 'general' or 'group' factors are necessarily present. In the case of three variables and $K = -1$ the probable error of his function reduces to

$$\frac{2 \cdot 698}{\sqrt{N}} \sqrt{(1 - P_{12}^2)(1 - P_{23}^2)(1 - P_{31}^2)}.$$

In the development of the mean squared deviation,

terms of order $1/N^2$ have been neglected and normal distribution of the variables has been assumed throughout.—**W. F. P. M'Lintock and J. Phemister**: A gravitational survey over the buried Kelvin Valley at Drumry, near Glasgow. This survey, with the Eötvös torsion balance, was undertaken by H.M. Geological Survey to amplify what was previously known from a series of isolated borings. The average specific gravity of the sands and clays filling the valley is 1.72, and that of the underlying rocks (Carboniferous Limestone Series), 2.3. The pre-glacial valley of the Kelvin, filled in places to a depth of 300 feet with sand and clay, can be traced from Kirkintilloch to Drumry, where it was supposed to fork against a rock-mass which there rises to 74 feet from the surface, one branch continuing westwards to the north of that mass as a deep channel. The gradients have been determined at 68 stations and an isogam map has been constructed from these gradients.—**L. N. G. Filon**: On a quadrature formula for trigonometrical integrals. Formulæ of numerical integration such as Simpson's Rule are not applicable as they stand to cases where the integrand is a function which has rapid oscillations, like $f(x) \sin kx$. A formula is derived appropriate for this contingency; it is a generalisation of Simpson's Rule, and reduces to it when k is zero.

PARIS.

Academy of Sciences, Oct. 15.—**H. Andoyer**: The analytical theory of perturbations and the theorem of Poisson.—**Maurice Hamy**: A property of diffraction by a circular opening.—**Ch. Fabry**: The rôle of the atmospheres in the occultations of the stars by the planets. A discussion of the probable effects of atmospheres on the planets on the phenomena observed during the occultation of a star.—**Ch. Nicolle, C. Mathis, and Ch. Anderson**: The unicity of the recurrent spirochaetes of the Dutton group.—**Georges Giraud**: Non-linear partial differential equations of the second order of the elliptic type.—**Florin Vasilescu**: The surfaces of level of the potential of an aggregate of points.—**N. Cetajev**: The Poisson stability.—**F. Rochefort**: A new method of feeding explosion motors. A special form of pulveriser is described capable of utilising gas oil as fuel, for which the flexibility of the petrol carburettor is claimed.—**J. Peltier**: The equations of motion of a motor-car.—**R. Mazet**: Flow through a long, narrow rectangular orifice.—**D. Eginitis**: The problem of the tide of Euripus.—**R. Jarry-Desloges**: Researches on the position of the axis of rotation of the planet Venus.—**Paul Lévy**: The vibrating spaces of M. Winter.—**W. Broniewski and B. Hackiewicz**: The structure of the copper-tin alloys. In this work an attempt to reach true equilibria in the alloys was made by means of prolonged annealing, in one case for 7000 hours at 299°C. The slowness with which equilibrium is established, as established by this work, proves the preponderating importance of annealing in the study of the structure of alloys by indirect methods.—**Jean Cabannes**: The depolarisation of the secondary radiations in the complex light which results from the molecular diffusion of a monochromatic radiation.—**J. Harroy and A. Brichant**: The discovery of a coal basin in eastern Morocco.—**Marcel E. Denaeyer**: Geological sketch of French equatorial Africa, of the Cameroons, and neighbouring regions.—**L. W. Collet, R. Perret, M. Billings, and Mlle. R. A. Doggett**: The presence of the crystalline of the Aiguilles Rouges massif in the Cirque du Fer à Cheval (Hautes Alpes limestones of Sixt, Haute Savoie).—**Ch. Courtot**: The condensation of chloroindane with phenols.—**Bourguel and Rambaud**: The catalytic influence of the hydrogen ions in the internal dehydration of a cis-ethylene

γ -glycol in the presence of water.—**R. Combes**: Critical study of the method of Sachs applied to the measurement of migrations of substances. The author considers that the errors inherent in Sachs's method render it useless for the study of the migration of substances in leaves.—**L. Maume and J. Dulac**: The positive, zero, and negative antagonism of binary mixtures of electrolytes with regard to plants.—**André Piédallu and A. Balachowsky**: The utilisation of chloropicrin against cochineal insects harmful to orange trees or date palms. Chloropicrin is effective for this purpose if used in doses of 15-20 gm. per cubic metre.—**R. Guillin**: The integral dissociation of silicates by carbonic acid, by humic acids, and connected reactions. Whatever may be the nature of the humus-bearing soils, and whether containing lime or not, carbonic acid and the humic acids can cause the disintegration of silicate rocks, sodium and potassium being first eliminated, then lime and magnesia, and finally the aluminium, the latter alone remaining fixed to the humic acids.—**Philippe Fabre**: The inefficacy of prolonged continuous currents in neuro-muscular stimulation.—**René Hazard and Mlle. Jeanne Lévy**: The cardiovascular action of the semicarbazone of tropinone and of the oximes of tropinone and pseudo-pelletierine.—**A. Paillet**: Experimental amicrobial silk-worm disease (*gattine*) and the rôle of intestinal cytotoxic substances in the epidemiology of silk-worm diseases.—**Moycho**: The action of bacterial proteolytic enzymes: the influence of pH on proteolysis. In acid media, pH 4, the proteolytic enzyme of *B. pyocyaneus* does not act on gelatine, whilst the enzyme of *B. prodigiosus* acts with difficulty. As the acidity is reduced the proteolytic action increases, reaching a maximum at about pH 8, after which it diminishes.—**R. Douris and J. Beck**: A simple reaction for differentiating normal and syphilitic sera with the aid of organic colloids. The proposed reagent is a solution of sodium oleate acidified in the presence of the serum with dilute phosphoric acid. Advantages are claimed for this sero-diagnostic method over those in ordinary use for the detection of syphilis.—**Y. Manouélian and J. Viala**: The nerve cells and the virulence of the pneumogastric in canine hydrophobia.—**Bordier**: A new application of high frequency currents: medicinal d'Arsonvalisation.

Oct. 22.—**G. Bigourdan**: Description of a new form of comet finder.—**Ch. Fabry**: The rôle of the atmospheres in occultations of stars by the planets. Assuming the existence of atmospheres on the planets, details are given of the effects on the occultation of stars which might be expected. The cases of Mars, Mercury, Venus, Jupiter, Saturn, and the moon are considered.—**Maurice de Broglie**: Remark on the fine structure of the Compton effect.—**Jean Perrin and Mlle. Choucroun**: The velocity of photochemical reactions. A photochemical study of two chemical reactions where the reagents were practically non-fluorescent. The law of mass action was found to apply to each of these.—**J. Auclair and J. Villey**: The thermodynamic diagram of the Rochefort system.—**Delloue**: Lines of curvature passing through an umbilicus.—**Laurence Chisholm Young**: The change of variable in simple absolutely convergent integrals.—**Fr. Wolf**: Theorems of unicity of trigonometrical series representing pseudo-periodic functions.—**Grialou**: Rotational movement of non-perfect liquids with permanent regime.—**Mokrzycki**: The determination of the characteristics of an aeroplane based on the petrol consumption.—**N. Stoyko**: The influence of the personal equations on the determination of the time by the meridian telescope, with an impersonal micro-

meter.—L. Goldstein: The passages caused in wave mechanics.—Néda Marinesco: Dielectric properties and the structure of absorbent colloids. From measurements of the dielectric constants of solutions of varying concentrations of methæmoglobine, soluble starch, and gum arabic, a figure is calculated giving the number of cubic centimetres of water dielectrically saturated and fixed per gram of solid colloid.—R. de Malleman: The internal field of polarisation. A new theoretical expression for the refractive power is calculated. The Lorentz factor $(K+2)/3$, or Gladstone factor $(\sqrt{K+1})/2$ is replaced by $3K/(2K+1)$.—Paul Soleillet: The polarisation of the resonance radiations of zinc. From the experimental results given, the approximate value of the mean life of the atom in the excited state is calculated on the basis of Elridge's theory; it is $T=10^{-5}$.—A. Nodon and G. Cuvier: Researches on the radioactivity of wines. The radioactivity found in the specimens examined varied between 0.1 and 0.01 that of uranium.—J. Errera: Molecular associations. Relations between the vapour pressure of binary liquid mixtures and the polarity of the molecules of the constituents.—R. Levailant: The preparation of neutral sulphuric esters. Details of the method of preparation of *n*-propyl chlor-sulphonate and *n*-propyl sulphate and of the corresponding β -chloroethyl compounds.—N. Menchikoff: The age of the Ougarta grits (Western Sahara).—A. Rivière: The prolongation into Italy of the Pyrenees-Provençal irregularities of the east of the Maritime Alps.—Auguste Lumière and Mme. Malespine: Protection against anaphylactoid shock by means of magnesium hyposulphite. The shock produced by the injection of barium sulphate suspensions can be minimised by the simultaneous injection of a solution of magnesium hyposulphite.—A. Policard: The variations of thermal retraction shown by various regions of the ossification cartilage.

GENEVA.

Society of Physics and Natural History, Oct. 25.—G. Tiercy: The method of indicating gaining or losing of chronometers. A recent discussion compares the method used by seamen, in which the correction is given with its algebraic sign, with that of the clock-makers, who give the rate, that is to say, the quantity by which the chronometer gains or loses: these two magnitudes are connected by the relation: Correction = -(rate). He decides in favour of the clock-makers' view, which he considers more in accordance with the interpretation of the plain meaning of the words gain or loss.—R. Matthey: The chromosomes of the viper (*Vipera aspis*). The diploid number $2N$ is 41. There are 21 macrochromosomes and 20 microchromosomes. The haploid plates of the first kinesis amount to 11 large elements and 10 small; those of the second kinesis have sometimes 11, sometimes 10 macrochromosomes, hence there is male digamety and heterochromosomy of the type X0.

WASHINGTON, D.C.

National Academy of Sciences (*Proc.*, Vol. 14, No. 9, Sept. 15).—D. L. Webster, H. Clark, R. M. Yeatman, and W. W. Hansen: Intensities of *K*-series X-rays from thin targets. The targets consisted of films of silver deposited by evaporation of molten silver on to a beryllium block; their thickness ranged from about 30 Å. to about 280 Å. Such films allow almost all the cathode rays to pass without appreciable loss of energy, and give a measure of the relative intensities of *K*-series X-rays. Present theories of the effect are only qualitatively in accord with the results.—C. J.

Brasefield: The spectrum of the hydrogen molecular ion. A canal ray beam was photographed 0.5 cm. behind the cathode and perpendicularly to the beam, with varying pressures. Photometric records of the plates showed that the lines could be divided into three groups: (1) a large number increased rapidly in intensity with increasing pressure; they are due to excitation of the resting gas by moving hydrogen molecular ions; (2) a group of lines of almost constant intensity; and (3) a third group, which increased in intensity to a maximum at pressures of 0.005-0.008 mm. of mercury, and then decreased; these are due to hydrogen molecular ions (H_2^+). These last have been arranged in branches.—Louis Harris: The absorption spectrum of nitrogen dioxide. Pure nitrogen dioxide was examined in quartz cells. Keeping one set of cells at 125°-140° C. gave the spectra of the single molecules, NO_2 ; reducing the temperature gave spectra of mixtures of single, NO_2 , and double molecules, $(NO_2)_2$. At -42° to 28° C. spectra were obtained of the double molecules $(NO_2)_2$, in the gaseous phase alone. The single molecules give many bands, several with fine structure, between 6000 Å. and 2250 Å.; distinct bands appear in the region 2600-2250 Å. Absorption due to double molecules is continuous; two bands with maxima at 3500 Å. and farther in the ultra-violet merge into a continuous band extending from 4000 Å. into the far ultra-violet at high pressures.—R. C. Gibbs and C. V. Shapiro: The relation of hydrolysis to the validity of Beer's law. This law, that extinction, for a given thickness, is proportional to the concentration, is based on the assumption that no changes occur in the character of the absorbing centres with varying concentration. Data obtained with phenol phtalein and its derivatives and other indicators in alcoholic solution show that this assumption is not justified owing to the occurrence of hydrolysis, which produces new types of absorption centres. Hence solutions of 'neutral' salts of the phtalein series do not give the true absorption of the ion of the alkali salt.—Richard C. Tolman: Further remarks on the second law of thermodynamics in general relativity. An expression for the second law applied to an infinitesimal four-dimensional region in flat space-time is obtained from the older thermodynamics, and, on the basis of the equivalence hypothesis, this is regarded as true in curved space-time. The expression is generalised in co-variant form.—J. R. Green and R. J. Lang: Series spectra of cadmium-like atoms. The results for Sb IV have been classified.—Donald A. Johansen: The hypostase: its presence and function in the ovule of the Onagraceæ. The hypostase is a group of thick-walled cells between the bases of the two integuments of the ovule and directly on top of the end of the vascular bundle entering the latter. From an examination of many species of Onagraceæ from different habitats, it appears that it is an acquired characteristic arising as required to stabilise the water balance of a resting seed which will be dormant during a hot, dry season.—G. H. Parker: Glycogen as a means of ciliary reversal. Filter paper, which was rejected by the sea-anemone, *Metridium marginatum*, was carried in towards the mouth when impregnated with glycogen, due apparently to a reversal of the ciliary current.—H. J. Muller: The production of mutations by X-rays. An account of the work on the fly *Drosophila* and other organisms, with a bibliography. β -radiation appears to be most effective; the number of mutations varies with the dosage, but the 'degree' or character of the individual mutations does not. Changes other than losses in the chromosomes have been found.—Morris Marden: On the roots of a derivative of a polynomial.—Tracy Yerkes

Thomas: Concerning the *G group of transformations.—Oswald Veblen: Conformal tensors and connections. The system of invariants appropriate to the conformal geometry of Riemannian spaces.—Aristotle D. Michal: The group manifold of finite continuous point and functional transformation groups.

Official Publications Received.

BRITISH.

Development Commission. Eighteenth Report of the Development Commissioners for the Year ended the 31st March 1928. Pp. 200. (London: H.M. Stationery Office.) 3s. 6d. net.
 Proceedings of the Royal Society. Series A, Vol. 121, No. A787. Pp. 477. (London: Harrison and Sons, Ltd.) 16s.
 The Journal of the National Institute of Agricultural Botany. Vol. 2, No. 1. Pp. 84. (Cambridge: W. Heffer and Sons, Ltd.) 2s. 6d. net.
 The Journal of the Institution of Electrical Engineers. Edited by P. F. Rowell. Vol. 66, No. 383, November. Pp. 1101-1244+xxxii. (London: E. and F. N. Spon, Ltd.) 10s. 6d.
 Transactions of the Royal Geological Society of Cornwall. Vol. 16, Part 1: The One Hundred and Fourteenth Annual Report of the Council, with the Reports of the Treasurer and Curator and Papers read to the Society. Pp. 31. (Penzance.) 4s.
 The North of Scotland College of Agriculture. Report on the Work of the North of Scotland College for the Year 1927-28. Pp. 26. (Aberdeen.)
 Government of Madras. Administration Report of the Government Museum and the Connemara Public Library for the Year 1927-28. Pp. 16. (Madras: Government Museum.)
 Latex. By Dr. Henry P. Stevens. Pp. 68. (London: The Rubber Growers' Association, Inc.)
 Report of the International Conference on Cancer, London, 17th-20th July 1928, held under the Auspices of the British Empire Cancer Campaign. Pp. xxi+588. (Bristol: John Wright and Sons, Ltd.; London: Simpkin Marshall, Ltd.)

FOREIGN.

United States Department of Agriculture. Technical Bulletin No. 80: Tests of Blowfly Baits and Repellents during 1926. By D. C. Parman, E. W. Laake and F. C. Bishopp, and R. C. Roark. Pp. 15. (Washington, D.C.: Government Printing Office.) 5 cents.
 Department of Commerce: Bureau of Standards. Research Paper 29: Thermal Expansion of Magnesium and some of its Alloys. By Peter Hidnert and W. T. Sweeney. Pp. 771-792+2 plates. (Washington, D.C.: Government Printing Office.) 10 cents.
 Department of the Interior: Bureau of Education. Bulletin, 1928, No. 3: Schools for the Deaf, 1926-27. Pp. 17. (Washington, D.C.: Government Printing Office.) 5 cents.
 Proceedings of the United States National Museum. Vol. 73, Art. 22: Tertiary Fossil Plants from the Argentine Republic. By Edward W. Berry. (No. 2743.) Pp. 27+5 plates. (Washington, D.C.: Government Printing Office.)
 Bergens Jæger- og Fiskerforening. Rypeundersøkelsen 1921-1927. Pp. 18+18+21+9+4+20+41+8+8+54+13+34+8+5+8+9+71+5+8+67+16+52+38+49+35+84+118. (Bergen: A/S John Greigs Boktrykkeri.)
 The Museum of the Brooklyn Institute of Arts and Sciences. Science Bulletin, Vol. 3, No. 5: Heterocephalus, the remarkable African Burrowing Rodent. By W. J. Hamilton, Jr. Pp. 173-184+3 plates. (Brooklyn, N.Y.)
 Department of the Interior: U.S. Geological Survey. Bulletin 775: Geology and Lignite Resources of the Marmarth Field, Southwestern North Dakota. By C. J. Hares. Pp. vi+110+14 plates. 35 cents. Bulletin 798: Geology of the Muddy Mountains, Nevada; with a Section through the Virgin Range to the Grand Wash Cliffs, Arizona. By Chester R. Longwell. Pp. vi+152+17 plates. 50 cents. Bulletin 802: Bibliography of North American Geology for 1925 and 1926. By John M. Nickles. Pp. iii+286. 40 cents. Professional Paper 153: Studies of Basin-Range Structure. By Grove Karl Gilbert. Pp. vii+92+40 plates. 60 cents. Water-Supply Paper 540: Ground Water in the New Haven Area, Connecticut. By John S. Brown. Pp. vi+206+15 plates. 60 cents. Water-Supply Paper 581: Surface Water Supply of the United States, 1924. Part 1: North Atlantic Slope Drainage Basins. Pp. vi+246. 25 cents. Water-Supply Paper 590: Surface Water Supply of the United States, 1924. Part 10: The Great Basin. Pp. v+131. 20 cents. (Washington, D.C.: Government Printing Office.)

Diary of Societies.

FRIDAY, DECEMBER 7.

ROYAL SOCIETY OF MEDICINE (Otolaryngology Section), at 10.30 A.M.—G. F. Jenkins, T. B. Layton, E. D. Davis, and others: Discussion on Meningitis.
 INSTITUTION OF WATER ENGINEERS (at Geological Society), at 10.30 A.M.—J. Bowman: The Consumption and Waste of Water.—E. J. Rimmer: Legal Considerations relating to the Administration of Engineering Contracts.—A. W. Burt: The Sandfields.—W. T. Halcrow, G. B. Brook, and R. Preston: The Corrosive Attack of Moorland Water on Concrete.
 ROYAL ASTRONOMICAL SOCIETY, at 4.30.—Geophysical Discussion on Atmospheric Ionisation. Chairman, Dr. G. C. Simpson. Discussion to be opened by Prof. J. Nolan, and continued by Dr. J. S. Owens, Prof. A. M. Tyndall, and R. E. Watson.
 ROYAL SOCIETY OF MEDICINE (Laryngology Section), at 5.

INSTITUTION OF ENGINEERING INSPECTION (at Royal Society of Arts), at 5.30.—C. H. Faris: The Application of Electro-deposited Metals to Engineering.
 PHILOLOGICAL SOCIETY (at University College), at 5.30.—Prof. F. W. Thomas: Weak R in Central Asia.
 BRITISH PSYCHOLOGICAL SOCIETY (Esthetics Section) (at Bedford College for Women), at 5.30.—J. Littlejohns: The Appreciation of Pictures.
 SOCIETY OF CHEMICAL INDUSTRY (Liverpool Section) (at Liverpool University), at 6.—Prof. H. E. Armstrong: Hurter Memorial Lecture.
 NORTH-EAST COAST INSTITUTION OF ENGINEERS AND SHIPBUILDERS (at Mining Institute, Newcastle-upon-Tyne), at 6.30.—K. O. Keller: Combustion and its Difficulties in Marine Oil Engines.
 SOCIETY OF CHEMICAL INDUSTRY (Manchester Section) (jointly with Institution of the Rubber Industry—Manchester Section) (at Geographical Hall, Manchester), at 7.—Dr. L. Auer: Colloid-Chemical Changes in Rubber and in Fatty Oils.
 INSTITUTION OF ELECTRICAL ENGINEERS (Meter and Instrument Section), at 7.—W. Holmes: Load Levelling Relays and their Application in Connection with Future Metering Problems.
 INSTITUTION OF MECHANICAL ENGINEERS (Informal Meeting), at 7.—F. E. Robinson: Works Committees.
 ROYAL PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN (Pictorial Group—Informal Meeting), at 7.—H. Baird: Bromoil Transfer.
 JUNIOR INSTITUTION OF ENGINEERS, at 7.30.—Lt.-Col. J. T. C. Moore-Brabazon: The Future of Coal in relation to Industry (Presidential Address).
 GEOLOGISTS' ASSOCIATION (at University College), at 7.30.—J. G. C. Leech: St. Austell Detritals.—H. G. Smith: Some Features of Cornish Lamprophyres.
 TEXTILE INSTITUTE (Lancashire Section) (jointly with Bolton and District Managers, Carders, and Overlookers' Association) (at Saddle Hotel, Bradshawgate, Bolton), at 8.—A. Roe: Cleaning of Cotton in the Blowing Room.
 ROYAL SOCIETY OF MEDICINE (Anaesthetics Section), at 8.30.—S. Rowbotham: Preliminary Medication in Anaesthetics.
 SOCIETY OF CHEMICAL INDUSTRY (South Wales Section) (at Thomas' Café, Swansea).—Prof. T. C. James: Pollution of Rivers.
 OXFORD UNIVERSITY JUNIOR SCIENTIFIC CLUB.—Sir E. Farquhar Buzzard: The Harvey Tercentenary Film.

SATURDAY, DECEMBER 8.

ROYAL INSTITUTION OF GREAT BRITAIN, at 3.—W. Bayes: The Gulf between Painter and Public (I).
 MINING INSTITUTE OF SCOTLAND (at Royal Technical College, Glasgow), at 3.—J. S. Frame: Pavement Brushing versus Roof Brushing.—Papers to be discussed:—An Experience of Machine Mining in a Highly Inclined Seam, J. M. Williamson and J. Bilsland; Some Impressions of German Mining, D. C. Gemmill and J. Heron; Tru-lay Wire Ropes and Tru-lay Fittings, A. T. Adam.

MONDAY, DECEMBER 10.

CAMBRIDGE PHILOLOGICAL SOCIETY (in Cavendish Laboratory), at 4.30.—Dr. H. Jeffreys: On the Transverse Circulation in Streams.—J. Hargreaves: The Dispersion Electrons of Lithium.—W. R. Harper: The Obliquity Function to be Used in the Approximate Theory of Diffraction.—C. E. Eddy: The Passage of β -rays through Matter.—Papers to be communicated by title only:—H. D. Ursell: (a) Cayley's Problem of Seven Lines on a Quartic Surface; (b) Coincidence Formulae in Geometry.—J. A. Todd: On the Number of Planes in Hyperspace which Satisfy a Certain Set of Conditions.—W. N. Bailey: Note on Bateman's Expansion in Bessel Functions.—H. Pfeiffer: Der Isoelektrische Punkt von Zellen und Geweben.—P. Tate: The Dermatophytes, or Ringworm Fungi.—W. Seifrig: The Structure of Protoplasm.
 ROYAL GEOGRAPHICAL SOCIETY (at Lowther Lodge), at 5.—S. W. Boggs, A. R. Hinks, and others: New Map Projections.
 ROYAL SOCIETY OF MEDICINE (War Section), at 5.—Surg.-Comdr. P. M. Rivaz: Some Common Problems in Naval Hygiene.
 INSTITUTION OF AUTOMOBILE ENGINEERS (Birmingham Centre) (at Queen's Hotel, Birmingham), at 7.—Major C. G. Nevatt: Experiments on Self-Energised Brakes.
 INSTITUTION OF ELECTRICAL ENGINEERS (Informal Meeting), at 7.—E. W. Dorey and others: Discussion on Power Factor Tariffs and Methods of Metering.
 INSTITUTION OF ELECTRICAL ENGINEERS (Mersey and North Wales (Liverpool) Centre) (in Laboratories of Applied Electricity, Liverpool University), at 7.—E. H. Shaughnessy: Transatlantic Radio Telephony.
 INSTITUTION OF ELECTRICAL ENGINEERS (North-Eastern Centre) (at Armstrong College, Newcastle-upon-Tyne), at 7.—E. B. Wedmore, W. B. Whitney, and C. E. R. Bruce: An Introduction to Researches in Circuit Breaking.
 INSTITUTION OF AUTOMOBILE ENGINEERS (jointly with Institution of the Rubber Industry) (at Blackfriars Theatre, William Street, E.C.4), at 7.30.—W. H. Paul: The Tyre as an Article of Manufacture and Usage.
 INSTITUTION OF HEATING AND VENTILATING ENGINEERS (Associate Members' and Graduates' Branch) (at Borough Polytechnic), at 7.30.—E. T. Ollett: Air Filtration.
 INSTITUTE OF METALS (Scottish Local Section) (at 39 Elmbank Crescent, Glasgow), at 7.30.—F. Hudson: Scottish Moulding Sands and their Application to Non-Ferrous Casting.
 SURVEYORS' INSTITUTION, at 8.—F. G. Fleury: The Recent Rating Acts in Operation.
 BRITISH PSYCHOLOGICAL SOCIETY (Education Section) (at London Day Training College).—Miss M. B. Stott: An Experiment in Vocational Guidance.
 INSTITUTION OF ELECTRICAL ENGINEERS (Western Centre) (at South Wales Institute of Engineers, Cardiff).—W. W. Woodhouse: Overhead Electric Lines.

TUESDAY, DECEMBER 11.

ROYAL INSTITUTION OF GREAT BRITAIN, at 5.15.—Sir William Bragg: Diamonds (IV).
 INSTITUTION OF PETROLEUM TECHNOLOGISTS (at Royal Society of Arts), at 5.30.—Dr. A. Wade: Madagascar and its Oil Lands.