Societies and Academies.

LONDON.

Royal Society, June 2.—S. Chapman and A. E. Ludlam : A theoretical discussion of certain elastic constants of calcite and crystalline sodium nitrate. Upper limits are found theoretically for two of the elastic constants of calcite and crystalline sodium nitrate ; the calculations are based on the theoretical determinations of the potential energy of these crystals in various configurations. The theoretical upper limits found are larger than Voigt's measured values for calcite but of the same order of magnitude.

R. W. Fenning and H. T. Tizard : The dissociation of carbon dioxide at high temperatures. If mixtures of carbon monoxide, oxygen, and nitrogen are exploded, the explosion pressure is greatest when there is an excess of carbon monoxide in the mixture. If no nitrogen is present the explosion pressure is greatest when the ratio $CO/O_2 = 2$, and varies very little with the composition of the mixture near the maximum point. When nitrogen is present, a determination of the composition of the mixture which gives the greatest rise of pressure on explosion, leads to a simple method for determining the dissociation of carbon dioxide at high temperatures. Accepted values for the dissociation of carbon dioxide at high temperatures are much too high.

L. H. Callendar : The influence of boundary films on corrosive action. The surface of metals liable to local corrosion is normally more or less covered with an oxide film ; where this film is of higher potential than the metal itself, its distribution determines the location of the primary cathode and anode areas before the metal is in contact with the electrolyte. The distribution of this oxide film is determined by the presence of foreign substances on the metal surface and by irregularities in the surface itself. When metal and electrolyte come into contact, the oxide film is the primary cathode, metal passes into solution at un-oxidised parts of the surface, and continuance of this current between cathode film and metal is dependent on the prevention of diffusion of oxygen to the anodes; the original location of cathode and anode areas is likely to be altered by the distribution of oxygen within the solution. Boundary resistance between electrodes and electrolyte is an indicator of rate of corrosion. The normal cathodic oxide film formed in air has little effect, but thicker oxide films formed by heating give high boundary resistance and must tend to retard corrosive action ; oxidising electrolytes also retard by increasing boundary resistance. With aluminium, boundary resistance increases with increasing dilution of electrolyte and increasing thickness of any oxide film present on the metal surface.

F. H. Constable : The cause of the colours shown during the oxidation of metallic copper. Evidence has been collected showing that interference is the cause of the colours shown during initial stages of oxidation. The order of production of the colours corresponds with that for interference colours of air films of increasing thickness seen by transmitted light. Fall in electrical conductivity and mass of oxygen taken up per unit area of surface are proportional to the equivalent air thickness of the copper oxide film. The wave-lengths of the maxima in absorption or reflection bands, in the spectrum of light reflected from the film, move towards the red as the thickness of the film increases. Finally, general absorption causes blackness of film.

C. F. Elam : Tensile tests on alloy crystals (Parts i., ii., and iii.). Crystals of alloys of aluminium and zinc, containing up to 18 per cent. zinc, have been prepared by the method of straining followed by heat-treatment.

The direction and plane of slip under distortion is in a direction parallel to the diagonal of the cube (*i.e.* in a {110} direction) and on an octahedral {111} plane, as in aluminium. The alloys showed increased resistance to shear with increased zinc content, and the amount of elongation before fracture was reduced. Crystals were made by melting brass rods, containing 70 per cent. copper and 30 per cent. zinc, in graphite tubes and slowly cooling from one end. In every case these showed that slip under distortion occurred on an octahedral {111} plane in a {110} direction, as in copper. The elongation before fracture amounted in one case to 168 per cent. Resistance to shear in early stages of extension was slightly less than that of pure copper ; final shear-stress was greater.

A. J. Bradley and J. Thewlis : The crystal structure of a-manganese. Westgren and Phragmen have shown that the structure is cubic, the lattice dimensions being 8·894 Å.U. It contains 58 atoms per unit cell. The exact position of the atoms is defined by five parameters. The structure is based on a single body-centred cubic lattice, but each lattice point is replaced by a cluster of atoms, with tetrahedral symmetry. The interatomic distances range from 2·25 Å.U. to 2·95 Å.U., indicating an unequal distribution of electrons between the various atoms.

N. R. Sen : On Fresnel's convection coefficient in general relativity. A simple explanation of Fresnel's convection coefficient is furnished by Einstein's addition law of two velocities. But one would expect to obtain this law in the case of the addition of a small velocity to the velocity of light directly from Maxwell's electromagnetic equations in a moving material medium. We can take a gravitational field and try to obtain solutions of the form $f(x_1 - vt)$ of the modified Maxwell equations, in which there are two electromagnetic tensors F and H, which must also be connected by two more simple relations in a transparent medium. The conditions for the existence of the above plane waves lead to an algebraic quadratic equation for v, whose solution really gives Einstein's addition theorem for the electromagnetic wave velocity and the velocity of the medium.

Helga Pearson : On the skulls of early tertiary Suidæ, together with an account of the otic region in some other primitive Artiodactyla. Starting with the problem of the inter-relationships of the early tertiary Suidæ, it became necessary to reject from this family certain genera usually associated with it. This led to an examination of the otic region in those families, such as the Anthracotheriidæ and Hippopotamidæ, that are generally regarded as most nearly allied to the Suidæ. Finally, all available early Artiodactyl skulls were examined and an attempt was made to trace the probable course of evolution in this order of the otic region of the skull.

A. W. Greenwood and F. A. E. Crew : Studies on the relation of gonadic structure to plumage characterisation in the domestic fowl. (ii.) The developmental capon and poularde. It is not uncommon for a fowl as it attains maturity to assume the characters of the agonadic bird instead of developing male, or 'female, plumage and head furnishings. Such a bird is termed the developmental capon or poularde, and is in its characterisation entirely similar to the surgically caponised or ovariotomised individual. Examination of these birds, however, reveals that testicular or ovarian tissue is present though greatly reduced. This may be due to inherent imperfection in the gonadic tissue itself, or to imperfection in the environment (the body) in which it develops.

F. A. E. Crew : The laying hen with cock's plumage. (Part iii.) The cock-feathered laying hen is a female, normal in every respect save that her plumage becomes

as that of the agonadic bird following the moult, as the result of a transient disfunctioning of the ovary (and/or of the thyroid) at this time.

J. W. Trevan : The error of determination of toxicity. Curves expressing the relationship between mortality and dose for various drugs are discussed. It is suggested that, as a definition of toxicity, the average lethal dose for the animal and drug in question should be used. The expression ' minimal lethal dose ' should be dropped, because of the various meanings that have been attached to it. The average lethal dose is represented, with sufficient accuracy, by the dose which kills 50 per cent. of a random sample of animals ; the statistical error is at a minimum for doses in the neighbourhood of the average lethal dose.

C. K. Drinker and E. D. Churchill : A graphite suspension for intravital injection of capillaries. This fluid possesses qualities essential for physiological injections if employed in perfusion experiments in that the graphite particles are able to mix with blood without agglutinating and to pass through the capillaries without sticking to the walls. When injections of the fluid are made in intact animals, intravascular agglutination of the particles begins in about ten minutes and embolism takes place.

Geological Society, May 11.—P. G. H. Boswell : The Salopian rocks and tectonics of the district south-west of Ruthin (Denbighshire). The district extends southwards and south-westwards from Ruthin, and is bounded on the south by the northernmost fault (or Braich Fault) of the Llanelidan system of east-and-west fractures. It is composed of Salopian beds folded gently on axes running east-north-east and west-south-west. The western half of the area may be regarded as anticlinal ; the eastern half shows a synclinal tendency. The dominant faulting is north-eastward in trend. Like the folding and cleavage (which is generally parallel to the fold-axes, with a steep northward dip), it is regarded as Caledonian. North-and-south faulting, which borders the Vale of Clwyd in the north-eastern part of the area, is of post-Carboniferous age. Similarly, the east-and-west Braich Fault limits the fault-system of north-eastern trend to the south, and is also post-Carboniferous. Where the north-east and south-west fault-system meets the north-and-south fractures and the Braich Fault, the beds are much shattered. The Braich Fault is an old fracture, throwing to the north in post-Silurian times, along which tearing movement took place at a post-Carboniferous date.—R. C. Blackie : The geology of the country between Llanelidan and Bryneglwys (Denbighshire). The Llanelidan district consists largely of Lower Ludlow deposits. Wenlock beds are restricted to the area west and north-west of Gwyddelwern, but there is also a small inlier in the centre of the Llanelidan anticlinorium. The Wenlock Series comprises the Denbighshire Grit, the upper limit of which is approximately the summit of the zone of *Cyrtograptus rigidus* ; also a series of slab-like beds, representing the zone of *C. lundgreni*. The region came under the influence of the Caledonian movements, which resulted in folding, cleavage, and dominant south-west and north-east faulting. The Llanelidan and Bryneglwys Faults date also from this time. In post-Carboniferous times further movements of a torsional character affected the region, and movement was renewed along the master-faults, together with the initiation of smaller adjustment-dislocations between the Llanelidan and Bryneglwys Faults.

Physical Society, May 13.—J. W. T. Walsh : The theory of luminescence in radioactive luminous com-

pound. From the brightness curves of compounds made with the same luminescent material but with different radium concentrations, the brightness-time relationship is found to be of the form $B = rf(rt)$, where r is the radium content. The brightness curves are in excellent agreement with Rutherford's original theory of the destruction of active centres, provided this be combined with a simple hypothesis as to the cause of the progressive increase in the light absorption of the material which has been found experimentally. This leads to the following brightness-time relationship : $\log\{B/(b+B)\} + kt + a = 0$, where a, b, and k are constants, of which the last two are proportional to the radioactive concentration for any given grade of luminescent material.—E. Mallett : Distortion of resonance curves of electrically driven tuning-forks. Resonance curves with increasing exciting currents show increasing distortion until an unstable state is reached in which the amplitude for a given current over a certain frequency range can have two different values, depending upon whether the frequency has been approached from above or below. The indication here is that a decrease of resonant frequency takes place with increase of amplitude, and also an increase of damping. Static experiments show a departure from the straight line law both in the case of the deflexion of the fork prongs for given loads, and the flux change through the core for a given deflexion of the prongs. The effect of such departures on the equation of motion is considered mathematically, and it is shown that the term depending on the cube of the amplitude is the most important. Another effect of the non-linearity is the possibility of producing fundamental frequency vibrations in the fork by exciting currents of double frequency ; distortions of a second type consist of ' coupled circuit ' effects : these, at large amplitudes, are modified by distortions of the first type.

DUBLIN.

Royal Irish Academy, May 9.—A. W. Conway : Undulatory theory of two electron orbits. In a previous paper (with G. Keating) the question of the quantisation of certain symmetrical orbits (with certain assumptions as regards the force between the electrons) was dealt with. The resulting negative energy terms were of the enhanced Rydberg form $4R/(n+\mu)^2$ for two different types of orbits. The principles of the wave mechanics of Schrödinger are now applied, and for one type of orbit the terms are of the correct Rydberg form $R/(n+\mu)^2$.

PARIS.

Academy of Sciences, May 2.—Paul Appell : The creation of an institute of physico-chemical biology by M. Edmond de Rothschild.—Mesnager and Veyrier : The determination of the resistance of a structure on a reduced model. In the case of a dam, the effect of the water pressure can be studied experimentally on a small scale model by using a liquid of higher density than water (mercury) and material of smaller resistance than the material actually used on the dam.—G. Friedel : The existence of a salt dome in the Oligocene potash basin of the Haut-Rhin.—Charles Nicolle and V. Lumbroso : A new contribution to the knowledge of natural granular conjunctivitis of the rabbit. In man, and in the Barbary ape, the virus of the rabbit determines a granular conjunctivitis which differs from trachoma by its long incubation and its primitive and principal localisation on the lower eyelid.—Jules Amar : The origin and evolution of cancer. Reasons are given for the view that

cancer is a parasitic disease.—E. **Cartan** : The topology of simple real continued groups.—D. V. **Widder** : A theorem on the series of Dirichlet.—J. J. **Gergen** : Some theorems in Taylor's series having generalised gaps.—André **Charrueau** : The surfaces of equilibrium relating to a liquid mass of revolution possessing surface tension, in uniform rotation.— **Giacobini** : The Paris-Winnecke comet. On April 27, at the Paris Observatory, this comet showed as an elliptical nebulosity, major axis $10''$ to $12''$, with a marked condensation at one of the foci ; magnitude between $12 \cdot 5$ and 13.—Henri **George** : Two qualities of silica glass. Discussion of the effect of the presence of moisture in the powdered silica before fusion on the properties of the glass.—R. **Mesny** : The energy radiated by electro-magnetic networks.—Armand **de Gramont** : A gyroscope kept in motion by an alternating current supplied through its axes of suspension.—Josef Mikuláš **Mohr** : The relation between the classes of lines (of the spectrum) determined by temperature and the groups of lines determined by pressure.—F. **Croze** and J. **Gilles** : The structure of the second order spectrum of nitrogen.— C. **Mihul** : The electronic configurations corresponding to the emission of the third order spectrum of oxygen. —M. **Lambrey** and D. **Chalonge** : The use of the discharge in hydrogen as a source of a continuous spectrum in the ultra-violet. The discharge in hydrogen has already been used as a source of a continuous spectrum in the extreme ultra-violet, but its use has been difficult and the intensity feeble. Details are given for setting up a hydrogen tube working with perfect regularity for long periods and giving an intense continuous spectrum.—P. **Gabiano** : The alkaline cuprotartrates.—P. **Lecomte du Noüy** : An anomaly in the evaporation of solutions of sodium oleate and of digitonin at high dilutions.—F. **Bourion** and E. **Rouyer** : The boiling-point constant of aqueous solutions of potassium chloride and molecular equilibria of resorcinol in this medium.—P. **Job** : The substitution of ethylenediamine for ammonia in complexes in solution. In most of the complex ammonia salts one molecule of ethylenediamine can replace two molecules of ammonia. With thallium salts ammonia forms the complex ion $Tl(NH_3)$. Ethylenediamine gives the ion (Tl en) in which the ethylenediamine replaces the ammonia molecule for molecule.—A. **Andant** : The application of the spectrography of fluorescence to the examination of organic compounds. Results are given for olive oil, vaseline oil, and castor oil. The method is of analytical value.—Jean **Bouldoires** : The transformations undergone by aluminium bronzes.—G. **Gilta** : The isomerism of *p*-hydroxyphenylarsenic acid.—A. **Demay** : Hercynian strata and folds of the Massif of Maures.— R. **Bureau** : Anomalies of long duration in the propagation of short [Hertzian] waves.—Jacques **Maheu** and J. **Chartier** : The botanical origin of the lesser striated Ipecacuanha. This has been identified with *Manettia ignita* of the family of the Rubiaceæ.— L. **Maume** and J. **Dulac** : The minimum of toxicity of a mixture of two salts with regard to plants.—Lucien **Daniel** : Two new grafts.—L. **Carpentier** and G. **Thieulin** : The direct measurement of the magnitude of the retinal images in the dog and cat.—Ph. **Joyet-Lavergne** : The proportion of glutathione reduced is a character of the sexualisation of the cytoplasm.— Th. **Moreux** : Solar activity and certain phenomena of vegetation.—A. **Goris** and L. **Lachaise** : The phylactic action of brucine towards strychnine. If 8 mgm. or 10 mgm. of brucine is injected into dogs and one hour later a mortal dose of strychnine, all the dogs survive.—Etienne **Wolff** : The adaptation of amœba to saline solutions. Cysts without a membrane.

Official Publications Received.

BRITISH.

List of Members of the British Astronomical Association, September 1926. Pp. 37. (London.)

The Lister Institute of Preventive Medicine. Report of the Governing Body, 1927. Pp. 28. (London.)

Institute of Marine Engineers, Incorporated. Session 1926. Vol. 38 : Thirty-eighth Annual Report and Financial Statement and Minutes of Annual Meeting held on Friday, March 11th, 1927, at 6.30 p.m. in the Institute Premises, the Minories, Tower Hill, London, E.1. Pp. ccvii. (London.)

Proceedings of the London Mathematical Society. Second Series. Vol. 25. Pp. ii+546. (London : Francis Hodgson.)

Irrigation in the Empire. Memorandum and Questionnaire by Dr. B. A. Keen. Pp. 8. (London : Empire Marketing Board.)

Ceylon Journal of Science. Section B : Zoology and Geology. Spolia Zeylanica. Vol. 14, Part 1, April 30th. Edited by Dr. Joseph Pearson. Pp. 133+12 plates. (Colombo : Colombo Museum ; London : Dulau and Co., Ltd.) 3 rupees.

The Scientific Proceedings of the Royal Dublin Society. Vol. 18 (N.S.), No. 34 : The Production of the Resting-Spores of *Phytophthora infestans* on Potato Tubers. By Dr. Paul A. Murphy. Pp. 407-412+1 plate. 1s. Vol. 18 (N.S.), No. 35 : Some Further Cases of the Production of Diseased Shoots by Potato Tubers attacked by *Phytophthora infestans*, and a Demonstration of Alternative Sources of Foliage and Tuber Infection. By Dr. Paul A. Murphy and Robert M'Kay. Pp. 413-422+1 plate. 1s. 6d. Vol. 18 (N.S.), No. 38 : Methylene-Blue (Reductase Test) in Milk Grading. By Dr. M. Grimes, H. S. Boyd Barrett and Dr. J. Reilly. Pp. 437-441. 6d. (Dublin : Hodges, Figgis and Co. ; London : Williams and Norgate, Ltd.)

Western Australia : Geological Survey. Bulletin No. 87 : A Geological Reconnaissance in the Central and Eastern Divisions between 122° 30′ and 123° 30′ E. Longitude and 25° 30′ and 28° 15′ S. Latitude. By H. W. B. Talbot. Pp. 30+5 plates. Bulletin No. 93 : The Geology of portions of the Kimberley Division, with special reference to the Fitzroy Basin and the Possibilities of the Occurrence of Mineral Oil. By T. Blatchford. Pp. 56+8 maps. (Perth : Fred. Wm. Simpson.)

Abstracts of Dissertations approved for the Ph.D., M.Sc. and M.Litt. Degrees in the University of Cambridge for the Academical Year 1925-1926. Published by Authority. Pp. 74. (Cambridge : Printed at the University Press.)

Aeronautical Research Committee : Reports and Memoranda. No. 1044 (Ae. 231) : Full Scale Pressure Plotting Experiments on Hull and Fins of H.M.A.R. 33. By Lieut.-Col. V. C. Richmond. Pp. 26+30 plates. 1s. 9d. net. No. 1073 (Ae. 255) : Full Scale Measurement of Lift and Drag of a Bristol Fighter with Slotted Upper Wings and Standard Lower Wings. By J. K. Hardy. (A.2.b. Stability-Full Scale Experiments, 44. — T. 2386.) Pp. 3+3 plates. 4d. net. No. 1050 : Reports and Memoranda of the Aeronautical Research Committee published between the 1st January 1925 and the 28th February 1927. Pp. 8. 4d. net. No. 1071 : Wind Tunnel Tests of Aerofoil R.A.F. 34. By H. Davies. (A.3.a. Aerofoils-General, 171.—T. 2364.) Pp. 5. 4d. net. (London : H.M. Stationery Office.)

University of Reading : The National Institute for Research in Dairying. Annual Report for the Year ending 31st July 1926. Pp. 62. (Reading.)

FOREIGN.

Havsforskningsinstitutets Skrift. No. 23 : Översikt av isarna vintern 1919-20. Av Risto Jurwa. Referat : Übersicht der Eisverhältnisse im Winter 1919-20 an den Küsten Finnlands. Pp. 30+15 plates. 20 Fmk. No. 37 : Översikt av isarna vintern 1914-15. Av Gunnar Granquist. Referat : Übersicht der Eisverhältnisse im Winter 1914-15 an den Küsten Finnlands. Pp. 45. 20 Fmk. No. 38 : Regelmässige Beobachtungen von Temperatur und Salzgehalt des Meeres im Jahre 1924. Von Gunnar Granquist. Pp. 46. 20 Fmk. No. 39 : Die thalassologische Terminfahrt im Jahre 1925. Von Erik Palmén. Pp. 22+1 plate. 10 Fmk. No. 40 : Översikt av isarna vintern 1915-16. Av Gunnar Granquist. Referat : Übersicht der Eisverhältnisse im Winter 1915-16 an den Küsten Finnlands. Pp. 56. 22 Fmk. No. 41 : Havsforskningsinstitutets värksamhet under år 1925. Redogörelse avgiven av Rolf Witting. Pp. 21. 5 Fmk. No. 42 : Översikt av isarna vintern 1917-18. Av Gunnar Granquist. Referat : Übersicht der Eisverhältnisse im Winter 1917-18 an den Küsten Finnlands. Pp. 40. 18 Fmk. No. 43 : Dagliga vattenståndsuppgifter 1924. Av Henrik Renquist. Referat : Tägliche Wasserstandsangaben 1924. Pp. 48. 9 Fmk. No. 44 : Översikt av isarna vintern 1924-25. Av Gunnar Granquist. Referat : Übersicht der Eisverhältnisse im Winter 1924-25 an den Küsten Finnlands. Pp. 48. (Helsingfors.)

Akademie der Wissenschaften in Wien : Mathematisch-naturwissenschaftliche Klasse. Anzeiger. Jahrgang 63, 1926. Pp. viii+208. (Wien.)

Journal of the College of Agriculture, Hokkaido Imperial University, Sapporo, Japan. Vol. 17, Part 3 : Studies on the Correlations between Morphological Characters, Chromosome-number and Resistance to *Puccinia triticina* in Pentaploid-Bastards of Wheat. By Yoshihiko Tochinai and Hitoshi Kihara. Pp. 133-161. (Sapporo.)

Svenska Linné-Sällskapets Årsskrift. Argång 10, 1927. Pp. v+173. (Uppsala : Almquist and Wiksells Boktryckeri-A.-B.)

Proceedings of the United States National Museum. Vol. 70, Art. 9 : A Review of the South American Two-winged Flies of the Family Syrphidae. By Raymond C. Shannon. (No. 2658.) Pp. 34+1 plate. Vol. 70, Art. 22 : Richmond Faunal Zones in Warren and Clinton Counties, Ohio. By George M. Austin. (No. 2671.) Pp. 18. Vol. 71, Art. 3 : On a Collection of Orthopteroid Insects from Java made by Owen Bryant and William Palmer in 1909. By A. N. Caudell. (No. 2675.) Pp. 42. Vol. 71, Art. 9 : The Digger Wasps of North America of the Genus Podalonia (Psammophila). By H. T. Fernald. (No. 2681.) Pp. 42+2 plates. (Washington, D.C. : Government Printing Office.)