Early Science at the Royal Society.

March 9, 1663. Sir Robert Moray mentioned, that his majesty had the curiosity of weighing himself very frequently, in order to observe the several emanations of his body before and after sleep, tennis, riding abroad, dinner and supper; and that he had found, that he weighed less after tennis by two pounds three ounces (but his majesty drinking two draughts of liquor after play, made up his weight) after dinner, more by four pounds and an half.

March 10, 1669. An experiment was made in the artificial tin-arm of Dr. Goddard's contrivance, to find whether pulsation was made by an intumesence of the artery, or not? And it was found by several trials, that as the pulse beat, so the water rose in the glass-cane adapted to the said tin-arm: And this was found to hold in many pulsations, even to forty strokes; but the water was observed to ascend unequally in the glass.

March 11, 1668. There were dissected some oisters; and because the function of many parts of them were not yet known, Dr. King was desired to produce at his first conveniency a live oister, and lay open all the parts thereof, to the end that those, that are well known, might give light to those that are not so.

1674. The person, who should have made a discourse this day, being by urgent occasions detained from the Society, there was read out of the Register a discourse formerly given in by Mr. Boyle, about shining flesh.—This gave occasion to some hints for a general hypothesis for explaining the nature of light.

March 12, 1672. There was read a Latin letter of Dr. John Baptista Gornia, physician to the grand duke of Tuscany, dated at Florence, containing the writer's opinion concerning the disease, of which Dr. Wilkins, bishop of Chester, died.

1673. Dr. Grew produced two intire microscopical observations, about the texture of a piece of a trunk of a walnut-tree, and of one of the trunks of a hazel-nut.

March 14, 1665. Mr. Daniel Coxe gave some account how he was employed in examining the nature and figure of all sorts of salts, intimating that he conceived, that the origin of all salts was sea-salt. It being demanded, how then, and by what he distinguished salt? it was answered, by the alteration of the figure caused by the addition or mixture of something else.—He was urged to go on vigorously on so noble a subject.

1666. Sir Theodore de Vaux produced a paper containing a description of the tallow-chandlers' trade, and the ways of making candles with the pith of rushes, and of making candles in moulds, and cheap candles for poor men to burn.

1682. An account being given of Dr. Plot's having examined some earths sent by Mr. Flamstead, which the Dr. found to be different marls, Sir William Petty took occasion from hence to move, that the *criteria* or distinguishing qualities of several natural things might be so agreed on, that there might be no ambiguity in the terms. He enquired particularly what was the notion of marl, fullers-earth, clay, etc.? The words *considerably bigger* having been used in some things, Sir William Petty cautioned that no word might be used but what marks either number, weight, or measure.

March 15, 1676. Mr. Oldenburg produced a letter sent to him by an anonymous member, concerning Mr. Henry Bond's book "Longitude found," which, being read, it was ordered that Mr. Colwell should be desired to ask Mr. Bond, how he came to know the difference of longitude between London and Waygatz to be fifty-eight degrees.

Societies and Academies.

LONDON.

Royal Society, March 6.—E. D. **Adrian** and Sybil **Cooper**: The electric response in reflex contractions of spinal and decerebrate preparations. Records have been made of the reflex action currents in the tibialis anticus and vasto-crureus of spinal and decerebrate animals. The reflex contractions were produced by electric stimuli applied to the popliteal nerve. In the flexion reflex of the spinal preparation the electric response consists of a regular series of "primary" waves having the same frequency as the stimuli. If the stimuli are very strong and their frequency below 50 a second, small "secondary" waves may appear. In the decerebrate flexion reflex the secondary waves are usually present so long as the frequency of stimulation is low. In the decerebrate crossed extension reflex the secondary waves are still more conspicuous, and may be completely absent. These results agree with the observations of Liddell and Sherrington on the reflex mechanical response. The secondary waves are not due to proprioceptor impulses from the contracting muscle, for they persist after injections of novocain into the muscle.—A. **Fleming**: A comparison of the activities of antiseptics on bacteria and on leucocytes. Leucocytes which have been allowed to emigrate from a blood clot on to the walls of a capillary tube, or defibrinated blood containing its full quantum of leucocytes, exercise a powerful bactericidal action on staphylococci. When antiseptic solutions are brought into contact with such leucocytes or blood, the destructive action of the antiseptic on the leucocytes is much more marked than it is on the bacteria. When added to infected blood in certain concentrations, most of the antiseptics permit the development of almost all the bacteria implanted, although the blood without any antiseptic will destroy from 90 to 100 per cent. of the added cocci.

Faraday Society, February 18.—Sir Robert Robertson, president, in the chair.—A. P. **Laurie**: Suggestions for a magnetic theory of valency. If we assume an atom of the Langmuir type and also assume that the electrons themselves can be regarded as small electro-magnetic units produced by movement in an orbit much smaller than the diameter of the atom, a magnetic field is produced which would result, on the approach of two atoms, in the moving out of the two units so as to take up a position combining the two atoms together. The figure thus produced is really a section through a molecule in which the atoms have combined according to one of the suggestions made by Bohr. This method is, therefore, a simple one for dealing statically with a molecule of the Bohr type. The method of combination can be applied to the problem of the formation of water polymeres and hydration of ions.—T. Martin **Lowry**: The electronic theory of valency. Pt. IV. The origin of acidity. The increasing acidity of the hydrides from CH_4 to FH or from SiH_4 to ClH is attributed to a progressive diminution in the size of the orbits of the electrons by which the protons are linked to the central nucleus. Acylous atoms such as chlorine tend to diminish the size of the orbits of electrons which they share with another atom, and this effect can be transmitted to other orbits of the same quantum-number in the latter atom. In this way the transmission of acidity through a chain of atoms can be interpreted by means of a dynamic, instead of a static, model. Conversely, basylous groups must expand the orbits of electrons which

they share with other atoms. Thus an unsubstituted hydrocarbon chain should act as a neutral radical in carboxylic acids, since orbits shared by two carbon atoms will be of normal dimensions. Hydrogen directly attached to an atom of sulphur, phosphorus, etc., is more acylous than an alkyl radical because it allows for a greater contraction of the orbits; but even a proton is less acylous than the "lone pairs" of electrons in acids such as FH and ClH, since contraction is probably at a maximum in orbits which are entirely unshared.—E. **Hatschek** and R. H. **Humphry**: On certain differences between sols and gels of agar. Agar sols and gels containing 3 per cent. and more of agar show marked optical differences, inasmuch as the sols are clear in transmitted and reflected light, while the gels, though clear in transmitted light, show marked opalescence in reflected light. Owing to the lateral scattering of light, the gels also appear darker in transmitted light than the corresponding sols. The opalescence does not decrease when the gels are kept for several days at a temperature of 62° C., *i.e.* about midway between the setting and melting point. The conductivity of agar gels containing electrolyte is greater, for both direct and alternating current, than that of the corresponding sols, the difference increasing with increasing concentration of agar, and it is greater for alternating current than for direct current, the difference being slightly greater than that between the alternating and direct current conductivities of aqueous electrolyte solution of the same concentration without agar.—D. C. **Henry** and V. A. **Morris**: The influence of anions in the coagulation of a negative colloidal sol. The coagulating power of an electrolyte for a lyophobe sol is largely determined by the nature of the ion of opposite sign to the colloidal particle, but is also influenced by the ion of the same sign, which exerts a stabilising action. Experiments have been carried out on the coagulating powers for a (negative) gold sol of a series of salts of the same cation (sodium), with the object of determining the relative stabilising powers of the different anions. If the logarithms of the electrolyte concentrations and the corresponding coagulation times are plotted, the curves obtained are either linear or of small curvature. The results indicate the following sequence of stabilising power of various anions when associated with sodium ion in the coagulation of a gold sol: oxalate > HPO_4'' > CO_3'' > OH', citrate > HCO_3' > Br', I', acetate, valerate > butyrate, CNS' > SO_4'' > Cl', benzoate.—E. B. R. **Prideaux** and W. E. **Crooks**: The diffusion potentials and ionic mobilities of benzoates and salicylates, and their modification by a membrane of parchment paper. Diffusion potentials are generally increased by the interposition of animal, vegetable, and artificial membranes. This is attributed to a decrease in the transport number of the slower ion. On this view the slower ion is proportionately more impeded yet neither is completely unable to pass, as in the case of the true semipermeable membranes. In the cases considered, the potentials are not permanent, since the electrical double layer slowly moves towards the side of lower concentration. But these membrane potentials, unlike diffusion potentials, can be restored to their original values by stirring on each side of the solutions, if the volumes of these are large relatively to the area of the membrane and the rate of diffusion is slow. These potentials are best treated as modified diffusion potentials, and recent quantitative measurements on sodium benzoate gave results in accordance with the theory.

Aristotelian Society, March 3.—Prof. T. P. Nunn, president, in the chair.—L. A. **Reid**: Creative morality. Goodness manifests itself in social conduct, and must therefore be defined in terms wider than the social whole. It is the personal expression in social material of value experienced. As the artist creates beauty in the stuff of colours, sounds, words, so real goodness is created in the stuff of character and conduct. Creative activity cannot be reduced to terms of instinctive activity. It is the response awakened in man upon the felt cognition of intrinsic value, a cognition which takes place at the higher levels of human consciousness, where man is able to contemplate objects as they are in themselves and not as they are merely in relation to his needs. The supreme good for man is to realise value, *i.e.* to experience it and to create concrete values in different materials not of moral conduct only but of art as well. The supreme good is not a moral good alone.

DUBLIN.

Royal Irish Academy, February 11.—Prof. Sydney Young, president, in the chair.—W. McF. **Orr**: Integrals and series of generalised Fourier-type in associated-Legendre-functions. An arbitrary Dirichlet function can be expressed in the form $\Sigma_r C_r P_{m-r}^{m}(\cos\theta)$, where m is any given number, real or complex, and the values of r are positive integers, including zero. (When $m+\frac{1}{2}$ is a positive integer terms of another type occur.) Fourier analysis as applied to a physical problem involving associated L-functions is also proved valid. This problem has as analogue, in the much easier case of trigonometric functions, the solution from $x=a$ to $x=b$ of the equation

$$f_2(d/dt)dy/dx + f_0/(d/dt)y = 0,$$

subject to the end-conditions

$$A_1(d/dt)dy/dx + A_0/(d/dt)y = 0, \text{ at } x=a,$$
$$B_1(d/dt)dy/dx + B_0/(d/dt)y = 0, \text{ at } x=b,$$

f_0, f_2, A_0, A_1, B_0, B_1 being any polynomials whatever, and for arbitrary initial data. This problem and the corresponding one for Bessel functions are thus considered included. In these examples the initial y must have first and second differential coefficients; but the initial form of the solution furnishes expansions (not one unique expansion) of the initial y, which are valid for any Dirichlet function. The method is that of contour integration.—J. **Algar**, F. **Fogarty**, and H. **Ryan**: Dichromone and dibenzyldichromone. The study of vegetable colouring matters during the past twenty-five years has shown that many of them are related in structure and may be referred to the same parent type. Flavone, flavanone, flavonol, and chromone possess a very similar structure, and amongst derivatives of these four substances may be found many of the best known of the natural dyes. Ryan and O'Neill have already prepared substances related to these colouring matters which may be regarded as derivatives of diflavone and of diflavanone. Two syntheses of dichromone, a compound which is the parent substance of diflavone, are now described, together with a synthesis of dibenzyldichromone.—H. **Ryan** and N. **Cullinane**: Some derivatives of stilbene. 2 : 4 - Dinitrostilbene (from 2 : 4 - dinitrotoluene and benzaldehyde), on reduction with ammonium sulphide, was converted into 2-nitro-4-aminostilbene, the diazo-derivative of which, on being boiled with alcohol, gave 2-nitrostilbene. The latter compound was reduced by means of stannous chloride to 2-aminostilbene, which on diazotisation and treatment with alcohol and copper bronze yielded stilbene. 2 : 4-Dinitro-4′-methoxystilbene (from 2 : 4-dinitrotoluene and anisaldehyde) was converted by means of stannous chloride into 4-nitro-2-amino-4′-methoxy-

stilbene. This substance exists in two chromo-isomeric modifications, yellow and red, the red form being the more stable. The amine sulphate, on treatment with amyl nitrite, gave 4-nitro-4′-methoxystilbene-2-diazonium sulphate. 2 : 4 : 6-Trinitrostilbene (from 2 : 4 : 6-trinitrotoluene and benzaldehyde) was reduced by stannous chloride to 4 : 6-dinitro-2-aminostilbene, and the sulphate of this compound was diazotised by means of amyl nitrite, giving 4 : 6-dinitrostilbene-2-diazonium sulphate.

Royal Dublin Society, February 26.—Prof. E. A. Werner and later Dr. A. G. G. Leonard in the chair.—E. J. **Sheehy**: A note on the effect of the accessory food factors on the quantity of milk and butter fat. The fact that certain internal secretions, such as pituitrin or the substances liberated into the blood during pregnancy, have an influence on the activity of the mammary gland, suggested the possibility of a comparable effect on the mammary gland by the accessory food factors. Experiments were conducted on lactating goats by feeding a ration complete in all respects, except the vitamin, the effect of which was to be tested, and, after a suitable period, by adding this factor without otherwise changing the ration. Negative results were obtained with vitamins A and B. Vitamin C was not tested.—E. A. **Werner** and W. R. **Fearon**: A demonstration of some new reactions of cyanic acid.

EDINBURGH.

Royal Society, March 3.—G. W. **Tyrrell**: The geology of Prince Charles Foreland, Spitsbergen. Prince Charles Foreland consists chiefly of the Hecla Hook formation (Cambro-Ordovician), which has been folded in an orogenic belt continuous with the great Caledonian fold-mountain zone of Scotland and Scandinavia. The rocks are grouped lithologically into three divisions which have suffered different types of movement and metamorphism. Cataclastic structures are exceptionally well displayed in the rocks. A narrow area of Tertiary rocks occurs along the eastern coast of the island. These have been step-faulted to the east towards Foreland Sound; and as reciprocal structures are found on the opposite mainland side, Foreland Sound is a down-faulted trough or graben drowned by the sea.—J. **Cooper**: Investigation of the banded structure of a Fifeshire coal seam. The proportions of definite bands of the five-feet seam of Fifeshire cannot be accepted as an index of position. Determination of the other characteristics of the bands, namely, the coking quality, volatile and ash contents, was discussed from an economic point of view, while the presence of intrusive igneous rock in a coalfield was also dealt with as regards its influence on the properties of adjacent coal seams.

PARIS.

Academy of Sciences, February 18.—M. Guillaume Bigourdan in the chair.—Daniel **Berthelot**: Remarks on the communication of M. Bochet entitled "On the law of corresponding states of Van der Waals." The facts pointed out by M. Bochet are not new, and his criticism is regarded as unjustified. A résumé of work bearing on this question published during the last thirty years is given.—Paul **Dienes**: Tensorial determinants and the geometry of tensors.—H. **Germay**: The integration, by successive approximations, of partial differential equations.—M. **Soula**: The functions defined by Dirichlet's series.—Maurice **Roy**: The acceleration of waves of shock in perfect gases.—A. **Véronnet**: The adiabatic equilibrium of a gaseous star.—L. **Décombe**: Is the notion of entropy really extremely abstract?—M. **Volmar**: Photolysis and the law of photochemical equivalence. Photolysis obeys the law of photochemical equivalence: for each function it requires the intervention of radiations of well-determined wave-length corresponding to the maximum absorption.—Marius **Picon**: The hydrates of sodium thiosulphate. The author's experiments are not in agreement with the conclusions of Young and Burke: instead of twelve hydrates forming five groups proposed by the latter, the author concludes that there are only two groups.—N. **Perrakis**: The influence of the neighbourhood of the critical state of miscibility on volumes. Diagrams of experimental results obtained with the systems *o*-cresol-ethyl alcohol, phenylether-ethyl alcohol. The deformation of curves showing variations of volume as a function of the molecular concentrations of mixtures may be due to the proximity of the critical state of miscibility, and not, as has been in some cases assumed, to the existence of definite chemical combinations.—A. **Tian**: The measurement of the intensity of small sources of heat: the use of a compensation microcalorimeter. The temperature difference between the calorimeter and its jacket is measured with a sensitive thermocouple, and in certain cases reduced to zero by use of the Peltier effect in another couple. The stability of temperature of the jacket is important in measurements carried out over a long period of time, and this is secured by the use of multiple jackets.—W. **Kuhn**: The influence of temperature on the decomposition of ammonia by ultra-violet light. The photochemical decomposition of ammonia increases with the temperature, a rise of 100° C. corresponding with an increase of velocity of 50 per cent. This velocity increase does not obey the law of Arrhenius; probably there are several intermediate reactions between NH_3 and $N_2 + 3H_2$. Between 30 mm. and 300 mm. of mercury, the velocity is independent of the pressure.—V. **Auger** and Mlle. L. **Odinot**: The cobalt and nickel carried down by tin precipitated in the state of stannic sulphide.—H. **Gault** and Brindaban Chandra **Mukerji**: The determination of the copper indices of cellulose materials. Application of the Fontès-Thivolle molybdo-manganimetric method.—**Cornillot**: The constitution of phthalonic acid.—Léon **Bertrand** and Léonce **Joleaud**: The cretaceous and tertiary movements and the volcanic manifestations in the western part of Madagascar.—Ch. **Maurain**: Magnetic measurements in Brittany.—E. **Tabesse**: Magnetic measurements in Brittany (Ille-et-Vilaine and Loire-Inférieure).—G. **Truffaut** and N. **Bezssonoff**: The most favourable form of nitrogen for the higher plants. From the results of experiments extending over four years, it is concluded that mixtures containing nitrogen as urea show a marked superiority as nitrogen manures over ammonia salts, nitrates, and cyanamide.—Lucien **Daniel**: The coexistence of starch and inulin in certain Compositæ.—E. **Poyarkoff**: Contribution to the theory of the action of the lysines of the serum.—L. **Mazé**: The manufacture of Cantal cheese and the means of realising the purity of the lactic fermentation which ensures normal ripening.—Edm. **Sergent** and H. **Rougebilf**: The dissemination of yeasts in vineyards by insects; mutual action between yeasts and Drosophila. Contrasting the theories of carriage of yeast spores by dust and by insects, all the experiments favour the latter view.—A. **Peyron**: The importance of the myo-epithelial layer of the galactophore canals in the development of tumours of the mammary gland in the dog.