favour of the view which most embryologists previously held mainly as the result of circumstantial evidence. It is not surprising to find that as this and other facts all bearing in the same direction are brought to light, the prevalent idea regarding nerve regeneration after injury follows the same lines. Indeed, the number of those who hold the so-called "autogenetic theory" of nerve regeneration is being reduced nearly to vanishing point.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The Adams prize for 1909 has been awarded to G. A. Schott, late scholar of Trinity College.

The Adam Smith prize has been awarded to J. M. Keynes, fellow of King's College, for an essay on the "Method of Index Numbers."

LIVERPOOL.—On May 8 the following honorary degrees were conferred, among others:—*LL.D.*, Mr. A. J. Balfour, Lord Charles Beresford, Mr. Birrell, M.P., Sir John Brunner, M.P., Dr. Richard Caton, Lord Crewe, Sir Donald Macalister, Mr. Marconi, Lord Roberts, and Prof. Paul Vinogradoff; *D.Sc.*, Mr. Francis Darwin and Prof. J. L. Todd; *D.Eng.*, the Hon. C. A. Parsons. At a luncheon after the ceremony Mr. Balfour spoke upon the growth of the university movement. In the course of his remarks he referred to this growth as one of the most important and fruitful facts which has emerged in the experience of this generation. We live in an age of scientific discovery and industrial invention—in an age in which, from the very nature of the case, there is, and must be, a tendency to put into a less prominent position relatively, though not absolutely a less important position, the ancient studies which for centuries have occupied the educational interest and intellect of Europe. The problem to be decided is how to combine all the cultivation of these ancient studies with their newer sisters which have so much closer relation to the cultivation of the material needs of great industrial communities. There is no way of coordinating except to bring all the highest intellects concerned with both into a single organisation. It is an honour to be associated with a movement which is going to have a world-wide influence in the direction of not merely increasing industrial dexterity, but also improving and adding to the knowledge of nature, which is the greater security that the industrial and scientific movement in future shall never be divorced from those humanistic influences which have been the greatest element of intellectual progress in the history of our race.

MR. T. H. LABY has been appointed professor of physics in Victoria University College, Wellington, New Zealand.

HARVARD UNIVERSITY will lose one of the most distinguished members of its faculty in September by the resignation of Prof. G. L. Goodale, who will by that time have completed his seventieth year. Dr. Goodale has been connected with Harvard since 1872, when he was appointed instructor in botany and lecturer in vegetable physiology. In 1873 he was promoted to the assistant professorship in the latter subject. Since 1878 he has been Fisher professor of natural history and director of the botanic garden.

THE *Physikalische Zeitschrift* for April 15 contains the list of lecture courses to be given in the German universities during the summer semester. We note that at the University of Berlin seven professors and lecturers will deal with mathematics, five with astronomy and geodesy, thirteen with various branches of physics, three with meteorology, two with wireless telegraphy, twenty with the various branches of physical, inorganic, and organic chemistry, and ten with technical, physiological, botanical, and photographical chemistry.

BY a recent Act of the United States Legislature, provision has been made, says *Science*, for a biological station to be located on the shores of Devil's Lake, North Dakota. An appropriation has been made for building laboratories and providing annual maintenance. This laboratory will be well situated for the study of many interesting ecological and physiological problems, inasmuch as Devil's Lake is a large body of brackish water with no outlet and represents the collected water supply of a large interior drainage basin. The direction of the laboratory will be under the charge of the biological department of the State University, of which Prof. Melvin A. Brannon is head.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 6.—Sir Archibald Geikie, K.C.B., president, followed by Mr. A. B. Kempe, vice-president and treasurer, in the chair.—Reciprocal innervation of antagonistic muscles. Note xiv. Double reciprocal innervation: Prof. C. S. **Sherrington**. This communication establishes that the algebraic summation of excitation and inhibition pointed out in a previous note in regard to extensor muscles holds good also for flexor muscles. In regard to the mutual action of antagonistic muscles, it shows that three types of result have to be distinguished, and that in each of these reciprocal innervation is the controlling factor. The importance of reflex inhibition for the grading of intensity of reflex actions is illustrated by various examples, in some of which the excitatory stimulus remains of constant intensity while the inhibitory is varied, and in others the inhibitory stimulus is kept constant in intensity while the excitatory is varied; in both cases a very delicate grading can be obtained even with artificial stimulation, electric and so on. The action of strychnine on the flexor inhibition is shown to be, as in the case of extensor inhibition, a conversion of the inhibition into excitation. These effects, namely, grading, algebraic summation, and conversion of inhibition into excitation, are all found readily both in the decapitated and spinal animal and in decerebrate rigidity.—Note on a curious property of neon: Prof. J. Norman **Collie**. During some work with specially pure neon, it was noticed that, as the gas escaped at ordinary pressure from a Töpler pump up through the mercury in an inverted test-tube, each bubble glowed with a fine red glow. This property is very apparent if the neon is sealed up in a glass tube with mercury, and the tube shaken violently. It was expected that the glow would always be produced when the tube containing the neon and mercury was shaken. This was found not to be the case, for it was noticed in many instances that, after shaking for some time, the glow became very feeble. These tubes could at once be brought back to their original condition by allowing a discharge to pass through them from an induction coil. Sometimes, however, when a powerful discharge was passed through them, exactly the opposite effect was produced, and further sparking did not improve them. Platinum wires sealed through the ends of the tubes did not interfere with the property of glowing when shaken. Another tube was strongly etched inside with hydrofluoric acid, also without effect on the glow. Heating the tubes strongly did not destroy the effect, but, on the contrary, restored those tubes that had been spoilt by passing heavy electric discharges through them. It was found possible to produce in this way tubes that possessed the property of glowing only at one end, or glowing at both ends and not in the middle. The slightest trace of moisture entirely stops the glow. The tubes were filled at different pressures, varying from 120 mm. to 200 mm. pressure, as it was found that the glow was as bright at these as at ordinary pressures, and a saving in neon was thus made.—The properties of colloidal systems. I. The osmotic pressure of Congo-red and of some other dyes: Dr. W. M. **Bayliss**. Congo-red, although a colloid in the sense of not being diffusible through parchment-paper and exhibiting other colloidal properties, such as those dependent on surface effects, has an osmotic pressure equal to that which would be given if it were present in true solution in single molecules. The solutions are not resolvable into particles under the ultra-microscope. The theoretical osmotic pressure is only to be obtained in the complete absence of extraneous electrolytes. Even the carbonic acid present in ordinary distilled water is sufficient to cause a marked fall in the pressure recorded. The

manner in which electrolytes produce this fall is by causing aggregation of molecules to form particles. This is the case whether acid, alkali, or neutral salt be in question. The action of a stable colloid in protecting against the effect of electrolytes is shown to consist, in the cases of congo-red and of arsenious sulphide, in the production of minute aggregates, which, although causing fall in osmotic pressure by diminution of effective concentration, are not of sufficient size to precipitate. Hence the protective power can only be regarded as a limited one, due probably to the formation of complex colloids. The free acid of congo-red forms a deep blue colloidal solution when dialysed. This is easily resolvable under the ultramicroscope, but gives a definite and measurable, though small, osmotic pressure, about 14 mm. Hg for a 1 per cent. solution. Assuming the kinetic theory to be correct, this means that the aggregates contain, on an average, twenty molecules. Estimations of the molecular dimensions of this blue colloid were made on the basis of enumeration of the particles in unit volume by means of the ultramicroscope. The values found are larger than the accepted ones for water, &c., about 100 times, in fact. The whole of the results are capable of explanation on the assumption that colloidal particles possess the kinetic energy of molecules, but lend no support to any view that postulates the necessary presence of foreign electrolytes.—The origin and destiny of cholesterol in the animal organism. Part V.—On the inhibitory action of the sera of rabbits fed on diets containing varying amounts of cholesterol on the hæmolysis of blood by saponin: Mary T. **Fraser** and J. A. **Gardner.** In an earlier paper it was shown by comparative estimations of the total cholesterol-content of the blood of rabbits that had been respectively fed on ether-extracted bran, and on the same extracted bran with the addition of known amounts of cholesterol, that some, at any rate, of the cholesterol absorbed found its way into the blood-stream. It seemed desirable to ascertain whether the cholesterol was absorbed into the blood-stream as such, or in the form of esters, or in both states, and also whether the phytosterol of vegetable food can be utilised for the formation of cholesterol in the organism. Use was made of the observations of Hausmann, Abderhalden, and Le Count, who showed that, whereas cholesterol and phytosterol inhibit the hæmolytic action of saponin, their esters do not do so. A series of comparisons were made of the inhibitory action of sera of rabbits fed on extracted bran alone, on extracted bran, and, in addition, measured quantities of cholesterol, cholesterol esters, and phytosterol, respectively, on the hæmolytic action of saponin. Care was taken to keep the animals under strictly comparable conditions, and the different sets of hæmolytic experiments were carried out under diverse conditions. *Conclusions.*—(1) When cholesterol is given with the food of rabbits, some is absorbed, and finds its way into the blood-stream as free cholesterol; only a portion of the total cholesterol given in the food is absorbed, the rest being excreted unchanged. (2) Cholesterol when in the form of esters undergoes hydrolysis in part, at any rate, during digestion, and appears in the blood-stream as free cholesterol. (3) When animals are fed on phytosterol, this substance is in part absorbed, just as in the case of cholesterol, and appears in the blood-stream either itself or in the form of cholesterol.—Some effects of nitrogen-fixing bacteria on the growth of non-leguminous plants: Prof. W. B. **Bottomley.** Bacterial cultures prepared from the algal zone of Cycas tubercles taken from below the surface of the soil always contain a species of Azotobacter associated with *Pseudomonas radicicola.* Pure cultures of these organisms were obtained, and it was found that when they are growing in association there is an increased assimilation of free nitrogen.

Control	0·48 mgr. N. per 100 c.c.
Pseudomonas alone ...	0·91 ,, ,,
Pseudomonas + Azotobacter	1·21 ,, ,,

In Cycas tubercles the bacteria live, usually imbedded in a slime, in the open spaces of the algal zone, and the projecting cortical cells presumably absorb the nitrogenous products of bacterial activity. Experiments made to ascertain to what extent, if any, a mixed culture of Pseudomonas and Azotobacter applied to the roots of other non-leguminous plants might influence their growth, the nitrogenous bacterial products being absorbed directly by the plant, gave the following results:—*Oats.*—Pot experiments with oats grown in sand dressed with phosphates, potash, and lime. Treated pots watered once with the mixed culture solution. Average weight per plant: untreated, 0·42 grm.; treated, 0·74 grm.; increase, 0·32 grm. = 76 per cent. *Barley.*—Field experiments on limed plots of 484 square yards. Seed only treated with bacterial culture. Yield per plot: untreated, 608 lb.; treated, 691 lb.; increase, 83 lb. = 13·6 per cent. The barley from a treated plot also yielded a higher nitrogen content.

	Mgr. N. per cent.	Weight of 1000 corns	Mgr. N. per corn
Untreated ...	1·55 ...	48·5 grms. ...	0·75
Treated ...	1·76 ...	49·5 ,, ...	0·87

Bulbs.—Galtonia candicans grown in sandy soil, manured and limed, 250 bulbs of equal size in each bed. Treated bed watered twice with mixed culture solution. Weight of bulbs when lifted and dried at end of season: untreated, 69 lb. 3 oz.; treated, 82 lb. 1½ oz.; increase, 12 lb. 14½ oz. = 18·6 per cent. *Parsnips.*—Grown in garden soil, manured and limed. Half the bed watered once with mixed culture solution. Every parsnip grown in the bed included in the weights. Untreated, 68 roots weighed 22 lb. 14 oz.; average per root = 5·38 oz; treated, 65 roots weighed 26 lb. 10 oz., average per root, 6·55 oz.; increase per root, 1·17 oz. = 21·7 per cent. In all the experiments the soil was treated with lime before the mixed culture was applied.

Royal Microscopical Society, April 21.—Mr. E. J. Spitta, vice-president, in the chair.—The recent and fossil Foraminifera of the shore sands of Selsey Bill, Sussex: E. **Heron-Allen** and A. **Earland.**—The disappearance of the nucleolus in mitosis: E. J. **Sheppard.**

Physical Society, April 23.—Dr. C. Chree, F.R.S., president, in the chair.—A want of symmetry shown by secondary X-rays: Prof. W. H. **Bragg** and J. L. **Glasson.** When a primary X-ray strikes an atom, a secondary X-ray sometimes starts out from the place of impact. The experiments described in the paper were made with the object of comparing the intensity of emission of the secondary X-ray in a direction making an angle of about 45° with the primary with the intensity in a direction making an angle of 135°, and therefore turning back almost completely. It was found that in the case of atoms of platinum, tin or aluminium, or of such light atoms as are contained in celluloid, the former was larger than the latter, being sometimes three times as great. Madsen has obtained similar, but much greater, inequalities in the case of the γ rays. When atoms of copper or iron were tested, atoms which give rise to a very soft radiation, there was little inequality. A similar inequality effect also occurs in the case of β rays. On the original pulse theory, calculation showed that there should be no inequality of the secondary X-radiation in any case. If that theory were abandoned, and the X-rays were supposed to be bundles of energy travelling through space, there did not appear to be sufficient definition of such entities as would enable any comparison to be made between theory and experiment. If the rays were supposed to be material the facts were generally in agreement with expectation, and afforded another instance of close parallelism between the phenomena of the X and the γ rays.—Transformations of X-rays: C. A. **Sadler.** It has been shown that the members of the group of metals chromium—silver emit under suitable primary beams radiations which are homogeneous, and which increase in penetrating power with increase of atomic weight of the radiator. Using these homogeneous beams, the tertiary radiation excited by them in other metals has been studied by the author. It was found that the tertiary radiation excited in any member of the group Cr—Ag was homogeneous, and its penetrating power was that characteristic of the radiation from the substance when excited by a primary beam. With any given tertiary radiator it was found that the intensity of the homogeneous type of radiation emitted when the homogeneous radiations from the members of the group Cr—Ag successively fell upon the radiator was inappreciable unless

the exciting radiation was more penetrating than that characteristic of the radiator.—Theory of the alternate-current generator: Prof. **Lyle.** The author points out that the theory of armature reaction as ordinarily discussed by electricians is unsatisfactory, as an important effect due to the mutual induction between the current in the field winding and the current in the armature circuit is neglected. To simplify the problem, the case of a simple ironless single-phase alternator is first discussed, and then the effects of hysteresis and eddy currents. The action of "dampers" in diminishing the heat-losses in the field circuit and the theory of the synchronous motor are also discussed.

Zoological Society, April 27.—Prof. E. A. Minchin, vice-president, in the chair.—A review of the species of the lepidopteran genus Lycænopsis, Feld. (Cyaniris auct. nec Dalm.), on examination of the male ancillary appendages: Dr. T. A. **Chapman.**—(1) Some points in the structure of *Galidia elegans*, and on the post-caval vein in Carnivora; (2) the post-caval vein and its branches in certain mammals: F. E. **Beddard.**—The comparative osteology of the passerine bird *Arachnothera magna*: Dr. R. W. **Shufeldt.**

Challenger Society, April 28.—Prof. d'A W. Thompson in the chair.—Photophores in Decapoda: S. W. **Kemp.** While many decapods emit a luminous secretion from various glands, true photophores are at present known only in five species of the three genera Sergestes, Acanthephyra, and Hoplophorus; in all of them an intensely blue pigment is associated with the organ; in one the pigment is situated in the corneal lens, in the others in the (presumably) light-producing cup of cells which lies immediately behind the lens, and the general body-pigment is absent where they occur. The organs increase in number with age and exhibit morphological stages. They are placed much as in Euphausids.—A new method of plotting currents from observations of drifters, used by the Scottish Fishery Board in the international study of the North Sea: Prof. **Thompson.** On a large chart divided into squares of 1° lat. and ½° long. all the observations were recorded by arrows of true direction and proportionate length; the "resultants" of these arrows, calculated for each square, showed a uniform cyclonic current from Shetland down and across the North Sea to Norway, in concentric belts round the area of dead water which had been shown to exist by the observations of a previous year.

CAMBRIDGE.

Philosophical Society, March 8.—Prof. Sedgwick, president, in the chair.—The nature of anthocyanin: Miss M. **Wheldale.** The communication deals with the red-purple-blue pigment "anthocyanin" occurring in plants. Following up the suggestion made by various investigators that there is some intimate connection between tannins and anthocyanin, genera from various natural orders were examined for tannin, and at the same time their pigments were subjected to the action of various chemical reagents. It was found that substances of the flavone series of natural colouring matters are widely distributed in plants, and from evidence based upon chemical tests and the results obtained in genetics these flavones appear to be essential to the constitution of anthocyanin.—An experiment on ionisation with γ rays: L. **Vegard.** The paper gives a short account of some experiments made with the object of finding whether the ionisation with γ rays is strictly an additive property. The additivity is tried for different angles between the directions of the two ray bundles, and in all cases the ionisation is found to be additive within a fraction of 1 per cent. In the introduction the author mentions that if the γ rays consist of pulses with a continuous wave-front, some departure from additivity under certain conditions was to be expected.—The nature of the ionisation produced in a gas by γ rays: R. D. **Kleeman.** It was found that when a volume of air is exposed to γ rays, and the ionisation in this volume by the secondary kathode radiation from surrounding objects is eliminated by a magnetic field, there still remains a considerable amount of ionisation due to the direct action of the γ rays on the gas. Now, it has been shown by Laby and Kaye that the ionisation in an ionisation chamber due to the penetrating radiation from the gas is small in comparison with the total ionisation. From a comparison of these two results it follows that γ rays produce, directly, δ rays, that is, kathode rays which have not sufficient velocity to produce any further ions themselves.—Uniform oscillation: Dr. **Young.**—The parametric representation of the co-ordinates of points on a cubic surface in space of four dimensions: H. W. **Richmond.**—The irreducible concomitants of two quadratics in n variables: H. W. **Turnbull.**

MANCHESTER.

Literary and Philosophical Society, April 6.—Mr. F. Jones, vice-president, in the chair.—Some colour demonstrations of the dissociating action of water: R. L. **Taylor.** When highly coloured solutions of ferric sulphocyanide and ferric salicylate are diluted with water the colour disappears. On the other hand, if a few drops only of a solution of potassium permanganate are added to half a litre of water a permanent coloration is produced. The author pointed out that the peculiar behaviour of these bodies was adequately accounted for by the "theory of ionic dissociation," according to which the ferric sulphocyanide and the ferric salicylate are dissociated into colourless ions of iron and sulphocyanide, whereas the potassium permanganate is dissociated into potassium and coloured manganic ions.—Report on the recent Foraminifera from the coast of the island of Delos (Grecian Archipelago): H. **Sidebottom.** Some of the most interesting forms described in the paper were *Polytrema miniaceum*, Linné, sp., *Truncatulina variabilis*, d'Orbigny, and a decorated form of *Rotalia beccarrii*, Linné.—Permian foot-prints: G. **Hickling.** By the aid of numerous figures the author showed the very close correspondence there was between foot-prints found in the sandstones of Mansfield, Notts, and Penrith, and those of the sandstones of Dumfries-shire and Elgin. The former rocks are undoubtedly of Permian age, but the age of the Dumfries-shire and Elgin sandstones is not definitely fixed owing to the fewness of the fossil remains found in them. The author suggested that the identity of the types of foot-prints here considered should be regarded as affording sufficient evidence to fix the age of the rocks in which they occur as Permian, and so settle a much controverted matter. This conclusion, he added, was further strengthened by the fact that not one of these forms could be matched by those found in the Triassic rocks.

EDINBURGH.

Royal Society, May 3.—Prof. Ewart, F.R.S., vice-president, in the chair.—*Strophanthus sarmentosus*, its pharmacological action and use as an arrow-poison: Sir Thomas **Fraser** and Dr. A. P. **Mackenzie.** Most of the material had been collected by members of the Colonial Medical Service in Nigeria, especially Dr. Dalziel and Dr. Dutton, and a number of poisoned arrows had been supplied by Sir Frederick Lugard. The main constituent in this arrow poison was made from the seed of *Strophanthus sarmentosus*, which resembled in its pharmacological properties those of *Strophanthus hispidus*. To determine its action an alcohol extract freed from substances soluble in ether was used. A detailed account was given of its action on the heart and skeletal muscles, both in small and large doses. The effects on the heart are the most important, small doses tending to produce a diastolic type of change and large doses a systolic type. There seem to be no direct effects on blood pressure or on respiration.—The histological changes in the liver and kidney after chloroform administered by different channels: Dr. G. Herbert **Clark.** The chloroform was administered in three ways:—(1) by inhalation; (2) in olive oil by the stomach; (3) by injection into the subcutaneous tissues of the back. By the first method the effect produced was very small. By the second method the mortality was great, and the organs underwent extensive changes and degeneration. Similar effects were produced by the third method, although the degree of degeneration was not so great. The changes were described in detail, and illustrated by microscopic slides.—The pathogenesis of *Micrococcs melitensis*: Dr. J. **Eyre.** The pathogenic effects produced by inoculation in various rodents and Carnivora were studied

in detail, the injection being intracerebral, intravenous, intraperitoneal, or subcutaneous. The question of infection was of importance in regard to the Maltese goat, and it was established by experiment that the micrococcus appeared in the milk of an infected goat. It was thus not improbable that the infection might be cutaneously carried from goat to goat by the act of milking. Man is susceptible to infection by subcutaneous inoculation, to infection through apparently intact mucous membranes, and the administration of infective food. Several cases of accidental laboratory infection, leading to acute and subacute attacks of melitensis septicæmia, were described.—Life and chemical work of Archibald Scott Couper: Prof. Richard **Anschütz.** Translated by Prof. Crum Brown. In this paper Prof. Anschütz gives a critical account of Couper's two experimental communications on benzene and on salicylic acid, and of his "new chemical theory." These papers were originally published in the *Comptes rendus* of the French Academy of Sciences within a period of less than twelve months. Couper was unfortunate with both his chief pieces of work. The presentation of the new theory to the academy was delayed, by no fault of Couper's, so that it did not appear until after the publication of Kekulé's famous paper, in which substantially the same theory was propounded. There is no doubt, as is conclusively proved by Prof. Anschütz, that Couper's work was quite independent of Kekulé's, but the delay in its publication necessarily threw it into the shade. Couper's experiments on salicylic acid were repeated by several eminent chemists, but none of them obtained Couper's results, and the general opinion was that Couper had made a mistake in the matter. It was not until twenty-seven years had elapsed that the investigations of Prof. Anschütz proved that Couper was right, and showed how his successors had failed. Couper's work was all done within one year, and nothing was heard of him by any of his fellow-chemists after 1858. Indeed, none of them knew whence he came, many supposed that he was a Frenchman, and none knew what had become of him. Prof. Anschütz and his friends made diligent search, and at last Prof. Crum Brown came upon a clue which led him to Kirkintilloch. There Dr. Whitelaw introduced him to Couper's cousins, and from them and from Mr. T. A. Dollar, London, the eminent veterinary surgeon, also a cousin, he obtained much information as to Couper's history. By a strange concurrence of circumstances Prof. Crum Brown made the acquaintance of an old friend of Couper, Geheimrat Berring, of Coblenz, who had studied with Couper at Berlin. From him much interesting matter was obtained. Couper was born on March 31, 1831, at Kirkintilloch, where his father was a manufacturer. He studied classics and philosophy in the universities of Glasgow and Edinburgh, and, along with his friend Alexander Hamilton, paid several visits to the Continent. In 1855 and 1856 he studied chemistry in Berlin, and in August, 1856, went to Paris to work in Wurtz's laboratory. He remained there until the autumn of 1858, when he returned to Scotland, and in December, 1858, accepted the post of second laboratory assistant in Playfair's laboratory in the University of Edinburgh. Near the end of that winter session his health broke down, and although he somewhat recovered, he remained an invalid, unable to undertake any kind of work, until his death on March 11, 1892. For the last thirty years of his life he lived at Kirkintilloch with his widowed mother, who survived him, dying in 1895 at the age of ninety-three. Prof. Anschütz says:—"In the history of organic chemistry the sorely tried Archibald Scott Couper deserves a place of honour beside his more fortunate fellow-worker, Friedrich August Kekulé."

PARIS.

Academy of Sciences, May 3.—M. Émile Picard in the chair.—The internal pressure of fluids and the law of intermolecular attraction: E. H. **Amagat.** The conclusion is drawn that the intermolecular attraction varies inversely as the fourth power of the distance.—A hæmogregarian of *Python sebai*: A. **Laveran** and A. **Pettit.** Nine diagrams accompany the paper, showing the parasite in various states of development. The species appears to be new, and the name *H. sebai* is proposed for it.—Singular systems of associated O networks: C. **Guichard.**—The application of Stefan's law in astronomy: Ch. **Fery.** The correction term for atmospheric absorption would appear to have been overestimated. A correction of 25 per cent. would appear to be nearer the truth than the 50 per cent. indicated by Crova.—A definition of the number of dimensions of an abstract *ensemble*: Maurice **Fréchet.**—The uniform analytical functions which remain continuous on a completely discontinuous *ensemble* of singularities: Arnaud **Denjoy.**—Remarks on the preceding communication: M. **Painlevé.**—The movement of a disc in a fluid: A. de Gramont **de Guiche.**—The use of the torsion balance as a seismograph: V. **Crémieu.**—The photographic registration of Brownian trajectories in gases: M. **de Broglie.** A microscope furnished with a camera is focussed on the gaseous suspension illuminated laterally by the concentrated beam from an arc lamp, and forms an image on the plate magnified about forty diameters. For a given size of particles the light diffused in the direction of the axis of the microscope is sufficient to make a record on very sensitive plates, in spite of the rapidity of the movements. A reproduction of such a negative is given.—The laws of the slope of water in canal of constant length and practically constant depth connecting a tidal with a non-tidal sea of the same mean level. The determination for each point of the canal of the limit of the maximum current, and the time at which the maximum current is produced: Philippe **Bunau-Varilla.**—The discontinuous discharge in a Geissler tube: H. A. **Perkins.**—The coefficients of expansion of gases: A. **Leduc.** A re-calculation of the values published twelve years ago, making use of the recently determined molecular volumes.—The fusibility of mixtures of gold and tellurium: H. **Pélabon.** The compound Au_2Te_4 is the only one indicated by the curves of fusion of mixtures of gold and tellurium; no indication was obtained of the gold telluride Au_2Te described by Margottet.—The melting point of platinum: W. **Waidner** and G. H. **Burgess.** The apparently close agreement between the values obtained for the melting point of platinum by different observers with the platinum, platinum-rhodium, or platinum, platinum-iridium thermocouples is due to the use of the same empirical extrapolation in each case. A different formula, equally well applying to the actual observations between 300° C. and 1100° C., leads to quite a different melting point for platinum. As regards the application of radiation methods to this problem, the divergence of the figures found appears to be due in great part to an insufficient knowledge of the exact value of the constant C_2 in Wien's equation $J = C_1\lambda^{-5}e^{-c_2/\lambda\delta}$.—The magnetic dichroïsm of mineral species: Georges **Meslin.**—A new automatic mercury pump: P. **Klein.** A description, with a diagram, of a modified Töpler pump. It is worked by means of an ordinary water pump, is made entirely of glass, and works without taps. A pump using about 650 c.c. of mercury gave a Crookes vacuum in a 500 c.c. vessel in fifteen minutes.—The conditions necessary for direct reactions and the sense of the electric current produced in the attack of metals by sulphur: Albert **Colson.** The heat of formation, the knowledge of which is indispensable in the study of chemical equilibrium, has not the same influence upon direct irreversible reactions which take place at a high temperature.—The physicochemical interpretation of differences of potential in living tissues: Pierre **Girard.** From a consideration of the changes of electromotive force produced in concentration cells by the interposition of an animal membrane, a physicochemical interpretation of the potential differences in living tissues is obtained.—The freezing of mixtures of water and normal butyric acid: H. **Faucon.** The acid was examined at twenty-nine different concentrations, and neither the fusion-point curve nor the microscopical examination of the separated crystals points to the formation of a definite hydrate.—The action of some oxidising agents upon silicochloroform: A. **Besson** and L. **Fournier.** Oxygen gives the known oxychloride Si_2Cl_6O, together with viscous oxychlorides of unknown composition. Silicochloroform reacts explosively with nitrogen peroxide, even at low temperatures. In solution (carbon tetrachloride) the reaction can be moderated, and corresponds mainly to $SiHCl_3 + 2NO_2 = SiO_2 + 2NOCl + HCl$, some water being also formed by a secondary reaction between

HCl and the NO_2.—The influence of the colloidal state on dyeing: Léo **Vignon.**—A new method of isomerisation in the terpene series: Géza **Austerweil.** Pinene, heated to a moderate temperature with an organic acid in sealed tubes, gives a yield of about 18 per cent. bornyl esters; if the pressure in the autoclave is raised some atmospheres by means of a bottle of carbon dioxide, the yield is much higher.—The suboxides of cæsium: E. **Rengade.** The oxide Cs_2O_2 was isolated and analysed.—Contribution to the study of the rocks of the eastern edge of the Armorican *massif*: L. **Vandernotte.**—The rational use of superphosphates: J. **Dumont.** It has been shown by cultivation experiments on the large scale that the application of superphosphate mixed with farm manure gives better results than the same manures applied separately.—The relation of insects, especially Lepidoptera, with the flowers of Asclepiadeæ, and in particular with that of *Araujia sericofera*. The mechanism of their capture: J. Künkel **d'Herculais.**—The indol-producing bodies of the urine: Ch. **Porcher.**—Bilirubin: M. **Piettre.**—The action of electrolytes on the hydrolysis of fats by the pancreatic juice: Emile F. **Terroine.**—Research on the hydrolysis of the proteins by acids: Henri **Mathieu.**—The mechanism of the synthesis of light impressions received by the compound eyes of the Diptera: P. **Vigier.**—The reproduction of Aphelinus and the individual interest in acts relating to the conservation of the species: Paul **Marchal.**—The enteroïds of the Acraspedes: Edgard **Hérouard.**—The formation of the Straits of Gibraltar: Louis **Gentil.**—The grotto of Bosse in the commune of Morée, Loir-et-Cher: Armand **Viré** and André **Piédallu.**—Some seeds and microsporangia of Pteridosperms found in the Nord coal basin: Alfred **Carpentier.**

DIARY OF SOCIETIES.

THURSDAY, MAY 13.

ROYAL SOCIETY, at 4.30.—Recent Solar Research: Dr. George E. Hale, For. Mem. R.S.—Utilization of Energy stored in Springs for the Production of Mechanical Work: A. Mallock, F.R.S.—The Elastic Limits of Iron and Steel under Cyclical Variations of Stress: L. Bairstow.—Functions of Positive and Negative Type: J. Mercer.—On a New Kind of Glow in Vacuum Tubes: Rev. H. V. Gill, S.J.

ROYAL INSTITUTION, at 3.—Newfoundland: J. G. Millais.

ROYAL SOCIETY OF ARTS, at 4.30.—Some Phases of Hinduism: Krishna Gobinda Gupta.

MATHEMATICAL SOCIETY, at 5.30.—Ternary Quadratic Types: H. W. Turnbull.—The Theorem of Gauss in the Theory of Attractions: Dr. J. G. Leathem.—On the Continuity or Discontinuity of a Function defined by an Infinite Product: J. E. Littlewood.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Economics of Medium Sized Power Stations: A Study of Comparisons between Steam, Gas and Oil Engines: A. J. J. Pfeiffer.

FRIDAY, MAY 14.

ROYAL INSTITUTION, at 9.—Solar Vortices and Magnetic Fields: Prof. G. E. Hale.

ROYAL ASTRONOMICAL SOCIETY, at 5.—Spectroscopic Comparison of o Ceti with Titanium Oxide: A. Fowler.—On some Points with regard to the Light Fluctuations of Variable Stars. A Rejoinder to Mr. H. C. Plummer's Criticisms: Karl Pearson.—Note on certain Coefficients appearing in the Algebraical Development of the Perturbative Function: R. T. A. Innes.—On Inclined Lines in Stellar Spectrograms, and on a New Method of Focussing a Star on the Slit of a Spectrograph: J. Lunt.—Observations of Helium D_3 Absorption in the Neighbourhood of Sun-spots in 1908: Capt. R. A. C. Daunt.—Note on certain Lines ascribed to Argon in Celestial Spectra: J. Lunt.—The Long-period Variable RT Cygni in 1908: A. N. Brown.—Results of Micrometer Measures of Double Stars made with the 28-inch Refractor in the Year 1908: Royal Observatory, Greenwich.—New Double Stars: Rev. T. E. Espin.—Note on the Solar Constant and the Apparent Temperature of the Sun: C. Fery.—On Absorption in Jupiter's Atmosphere, and its Probable Effect on the Colour and Albedo of the Belts and Zones: J. H. Reynolds.—*Probable Paper*: Solar Parallax Papers, No.7, The General Solution for the Parallax: A. R. Hinks.

PHYSICAL SOCIETY, at 8.—On a Bifilar Vibration Galvanometer: W. Duddell, F.R.S.—Effect of Temperature on the Hysteresis Loss in Iron in a Rotating Field: W. P. Fuller and H. Grace.—On a Method of Testing Photographic Shutters: A. Campbell and T. Smith.

MALACOLOGICAL SOCIETY, at 8.—Descriptions of the Animals of Two Land Shells from Perak; Skeat Expedition in the Malay Peninsula, 1899-1900: Lt.-Col. H. H. Godwin-Austen, F.R.S.—List of Mollusca from Christmas Island, Indian Ocean, and Descriptions of New Species: E. A. Smith.—Further Notes on Holocene and Recent Non-marine Mollusca from Perranzabuloe: Rev. R. Ashington Bullen.—On Non-marine Mollusca from an Early Neolithic Interment at Cuxton, Kent: A. S. Kennard.

TUESDAY, MAY 18.

ROYAL INSTITUTION, at 3.—The Hittites: (1) Monuments of Egypt and Asia Minor: Prof. John Garstang.

ROYAL SOCIETY OF ARTS, at 4.30.—Canada as a Field for British Investment: J. Obed Smith.

ROYAL STATISTICAL SOCIETY, at 5.—The Meat Supply of the United Kingdom: R. H. Hooker.

WEDNESDAY, MAY 19.

ROYAL MICROSCOPICAL SOCIETY, at 8.—On the Recent and Fossil Foraminifera of the Shore-sands of Selsey Bill, Sussex, Part ii.: E. Heron-Allen and A. Earland.—A New Illuminator for the Microscope: J. W. Gordon.

ROYAL SOCIETY OF ARTS, at 8.—Railway Development in China: A. J. Barry.

ROYAL METEOROLOGICAL SOCIETY, at 4.30.—The Anticyclonic Belt of the Northern Hemisphere: Col. H. E. Rawson, C.B.—Errors of Estimation in Thermometric Observations: A. Walter.

THURSDAY, MAY 22.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: Observations on the Urine in Chronic Disease of the Pancreas: Dr. P. J. Cammidge.—*Trypanosoma ingens*, n.sp.: Colonel Sir David Bruce, C.B., F.R.S., and Captains A. Hamerton, H. R. Bateman and F. P. Mackie.—The Incidence of Cancer in Mice of Known Age: Dr. E. F. Bashford and Dr. J. A. Murray.

ROYAL INSTITUTION, at 3.—Newfoundland: J. J. Millais.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Annual General Meeting.

FRIDAY, MAY 21.

ROYAL INSTITUTION, at 9.—Afforestation: Hon. Ivor C. Guest, M.P.

SATURDAY, MAY 22.

ROYAL INSTITUTION, at 3.—The Secret Societies of the Banks' Islands: Dr. W. H. R. Rivers, F.R.S.

CONTENTS.