

A COMPLIMENTARY banquet to Prof. H. E. Armstrong, F.R.S., took place at the Hotel Cecil on Saturday, May 13. Although intended, in the first instance, to take the form of a demonstration of affectionate regard on the part of his old students, it was soon found necessary to extend the scope of the celebration, which thus became the occasion for one of the largest scientific gatherings of recent years. The toast of the guest of the evening was proposed by the chairman, Prof. W. J. Pope, F.R.S., and was seconded by Mr. Maurice Solomon. The guests included Sir William Crookes, Sir James Dewar, Sir Chas. Lawes, Profs. H. B. Baker, A. Brown, Clowes, Crossley, Divers, Henderson, Kipping, and Wynne, Messrs. W. Barlow, G. T. Beilby, H. T. Brown, Cross, Hall, R. Messel, R. L. Mond, F. B. Power, and J. E. Stead amongst the chemists; engineering was represented by Profs. Perry, Dalby, Mather, and Sumner; education by Principal Miers, Mr. R. Blair, Dr. J. H. Cowham, Prof. R. A. Gregory, Mr. A. L. Soper, and Mr. C. M. Stuart; law by Mr. W. Phipson Beale, K.C.; and literature by Prof. M. A. Gerthwohl. On two occasions the Chemical Society has met in order to celebrate the jubilee of five of its past presidents, but we believe that only one similar gathering has previously been organised by a group of chemical students in honour of their professor. The success of the enterprise was most gratifying; "Central" students of every year, from the date of the opening of the college to the present day, united with chemists and others from all over the country, to the number of 230, in honouring one whose influence has been felt and valued by an exceptionally wide circle of admirers and friends.

THE following regulations with reference to the newly founded prize in memory of Lord Kelvin have just been issued by the University of Glasgow:—(1) The prize shall consist of a gold medal of the value of 10*l.*, together with the balance of the income of the capital fund accumulated during three years. (2) The adjudicators shall be the principal, the professor of natural philosophy, and the professor of mathematics. (3) The prize shall be awarded by the Senatus, on the recommendation of the adjudicators, at intervals of three years (the first period beginning with 1911) to the author of a thesis or published work in natural philosophy, including therein mathematical and experimental physics, which has been submitted and approved for the degree of Doctor of Science during the period, and which gives evidence of original research worthy in the opinion of the adjudicators of this special distinction. (4) In making their recommendation, the adjudicators shall have regard to the written reports presented to the faculty of science by the examiners and additional examiners appointed under Section X. of University Court Ordinance No. XXVI. (5) Not more than one award shall be made in each period of three years, and the prize shall not be divided. The adjudicators may, if they think fit, recommend that for a particular period of three years no award be made, and, in that case, the income of the prize shall be added to the capital fund. (6) The Kelvin prize and the William Jack prize shall not be awarded to the same person. (7) After the year 1920 the regulations may from time to time be modified by the Senatus, with the approval of the University Court, provided always that the prize shall continue to be awarded to graduates of the University for special distinction in original research relating to mathematical and experimental physics.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 11.—Sir Archibald Geikie, K.C.B. president, in the chair.—C. T. R. Wilson: A method of making visible the paths of ionising particles through a gas. The paths are made visible by condensing water upon the ions immediately after their liberation, an expansion apparatus being used which works without appreciable stirring up of the air. The trails of ions formed by the α particles from radium have in this way been made visible and photographed, very dense and sharply defined rays of cloud being formed on expansion. Air exposed to β rays gives clouds consisting mainly of

faint straight threads radiating from the source; these have not yet been photographed. In air exposed to γ rays, the cloud is again in the form of straight threads traversing the cloud chamber—the tracks of β particles from the walls. The cloud formed in air exposed to Röntgen rays is entirely concentrated in minute streaks and patches. A photograph shows these to consist mainly of fine threads not exceeding a few mm. in length, and generally far from straight, probably the tracks of kathode rays produced in the air by the X-rays. The whole of the ionisation would appear, as Bragg has already suggested, to be effected by the kathode rays derived from the X-rays.—W. H. Dines: The vertical temperature distribution in the atmosphere over England, and some remarks on the general and local circulation. This paper gives an account of the results of some 200 observations made in the British Isles in the years 1908, 1909, and 1910 on the temperature of the upper air. It discusses the annual variation of the temperature up to 14 kilometres, and shows that the annual range remains fairly steady, with a total amplitude of about 12° C. up to 11 km., above which the range suddenly drops to 3°, and the times of the maxima and minima go back two months. The question of the daily variation at great heights is then discussed. The relation between the temperature at various heights and the height of the barometer at the surface is dealt with, and it is shown how over a low-pressure area with the barometer below 740 mm. the temperature of the first 8 km. is very low, reaching at 7 km. a value of nearly 10° C. below its average value, and that above 10 km. it is considerably above the average. In the anti-cyclonic parts the conditions are reversed, and it is warm below and cold above. The height at which the isothermal region is met with in summer and winter and in times of high and low barometer is then referred to. A statement with regard to the existence of similar conditions that have been found to exist on the Continent is also given. In the second part of the paper various theoretical considerations are taken into account. It is shown that if an extensive and strong wind exists in any part of the atmosphere, warm air will be found somewhat below it on its right hand, and cold air above it on the right, with converse conditions on the left, and it is pointed out that this agrees with the distribution of temperature that is found to exist at the various levels of cyclones and anticyclones.—Prof. W. N. Hartley: Some mineral constituents of a dusty atmosphere.—Dr. H. Stanley Allen: The path of an electron in combined radial magnetic and electric fields. The path of an electron in a radial electric field superposed on a radial magnetic field is found to lie on a circular cone the vertex of which coincides with the magnetic pole. If the surface of the cone is developed into a plane, the trace of the path is a conic section with the vertex as focus. The solution in the particular case in which there is no electric field has been given by Poincaré; the path is then a geodesic line on the surface of the cone, and, of course, becomes a straight line when the cone is developed. In cases which can be realised experimentally, the developed path is hyperbolic, and does not in general differ greatly from a straight line. An account is given of some experiments carried out to illustrate the theory. The first observations were made with a focus tube in which the antikathode was the pole of an electromagnet. The phenomena observed are easily explained in terms of the theory. Other vacuum tubes were prepared in which a fine pencil of kathode rays could be produced by means of a Wehnelt kathode. In a radial magnetic field the stream of electrons assumed a spiral form, and a number of photographs were obtained showing the spiral paths on a cone of revolution.—Dr. R. A. Houston: The absolute measurement of light—a proposal for an ultimate light standard. A thermopile cannot be used for the measurement of candle-power, because it gives the same value to the energy of every wave-length, invisible as well as visible. The author has, however, found by spectrophotometric investigation in the ultra-violet, visible, and infra-red parts of the spectrum that if a filter consisting of aqueous solutions of copper sulphate and potassium bichromate in a particular strength in glass cells be placed before the thermopile, then this filter stops the ultra-violet and infra-red entirely, and lets through a fraction of each wave-length in the visible spectrum pro-

portional to its visibility. In other words, it weights each radiation according to its visibility. The voltage on a tantalum lamp was varied over a wide range, and its candle-power as read by thermopile and filters agreed well with the readings of a photometer. Owing to the high sensitiveness of the galvanometer required, the method is not suitable for commercial application, except perhaps for integration photometry, when a number of thermopiles might be connected in series with the one galvanometer. The importance of the method lies in the fact that it provides a satisfactory basis for heterochromatic photometry independent of the Purkinje phenomenon at all intensities. The author therefore proposes to use it for defining the unit of light intensity. He would define the latter as that source, the total intensity of radiation from which at a distance of 1 metre after passing through his filters would be x ergs/sq. cm., sec. For the standard candle x should be about 0.8.—Prof. A. C. Dixon: Harmonic expansions.

Royal Microscopical Society, April 19.—Mr. H. G. Plimmer, F.R.S., in the chair.—E. J. Spitta: Low-power photomicrography, with special reference to colouring methods.—E. J. Spitta: Report on Grayson's rulings.—E. J. Shepherd: The reappearance of the nucleolus in mitosis. This was an addendum to the author's previous paper, communicated in April, 1909, on the disappearance of the nucleolus in mitosis. In the present communication the author said that with a view to ascertain how and when the nucleolus makes its reappearance, the diaster stage is the one which calls for most careful study and observation. At or about the time of the formation of the dispirem, and before the diasters have lost their characteristic shape, a looping in the chromatin is observed, the number of loops varying in each daughter nucleus. It is in these loops that the nucleoli will appear, but it must not be inferred that a nucleolus will appear in each loop, as there are frequently more loops than nucleoli. The latter make their appearance when the division of the cell is well marked, and when the interzonal fibres have generally disappeared. From the results of his research, the author was of opinion that the nucleolus is a product of the chromatin injected into the loops by a process which can best be described as a "streaming in" process. A full account of the technique of staining and methods adopted, &c., which have led to the above conclusion, will be found in *The Journal of the Royal Microscopical Society*.—J. Murray: Second portion of a report from the Shackleton Antarctic Expedition of 1909 on the Canadian rotifera. Forty-two species (all bedloids) were collected among mosses. They included five new species, *Callidina asperula*, *C. canadensis*, *Mniobia obtusicornis*, *M. montium*, and *Harbrotrocha maculata*. There were also a number of peculiar varieties of other species. *Callidina asperula* has since been found in Ireland by the Clare Island Survey. Twenty-seven bedloids were previously recorded for the United States. Six of these occurred in their collections, so that the number of bedloids now known in North America stands at sixty-three species, but a number of these were of doubtful value. Among the rarer Canadian species were *Philodina australis* (Australia and Canada), *Callidina speciosa* (British Guiana and Canada), *C. zickendrahti* (Russia and Canada).—Señor Domingo de Oureta: A new piece of apparatus for photomicrography, with the microscope in the inclined position.

Geological Society, April 26.—Prof. W. W. Watts, F.R.S., vice-president, in the chair.—A. Wade: The Llandoverly and associated rocks of north-eastern Montgomeryshire. The area dealt with is near Welshpool, and comprises part of the Severn Valley and the whole of the Vale of Guilsfield. In the succession worked out, the Ashgillian and the Valentian are distinguished for the first time, while the distinction between the Wenlock and the Ludlow beds is brought out by means of graptolite zones. The stratigraphical succession is shown by traverses. The district is shown to be transitional in character between neighbouring districts on almost every side. The structure of the area is that of an anticline with "keystone" faulting. The two boundary-faults of the arch have considerable downthrows. An account is given of the Welshpool Dyke. The glacial geology of the area is described.

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three series of deposits being observed:—(1) a high-level series; (2) a low-level series; and (3) a stratified series. The Guilsfield Valley is shown to have been occupied by a glacial lake, and the reversed drainage of the Cefn-Yspn Brook is shown to be connected with a "col" through which the overflow water drained.—Dr. J. D. Falconer: Geology of northern Nigeria. The protectorate covers an area of about 255,000 square miles, over half of which crystalline rocks are exposed at the surface. Hard, banded gneisses of an Archæan type are intermingled with quartzites, phyllites, schists, and gneisses of sedimentary origin, so as to suggest that the two series, while originally unconformable, have been later affected by a common folding and foliation along axes predominantly meridional in direction. The two series have also been pierced by igneous intrusions of a granitic type. Folded and faulted rocks of Cretaceous age are found. These Cretaceous rocks are overlain unconformably by a horizontal series of sandstones, grits, conglomerates, and ironstones, which in Sokoto province contains intercalations of Middle Eocene limestone. Volcanic activity occurred during Tertiary times, and gave rise to fields of basaltic lava in Bauchi and Bornu, as also to numerous puffs of trachyte, phonolite, olivine-basalt, and nepheline-basalt throughout southern Bauchi, Muri, and Yola. Repeated minor oscillations during the latter part of the Tertiary era culminated in the elevation of the Bauchi plateau, the depression of the Chad area, and the establishment of the present river-system.

PARIS.

Academy of Sciences, May 1.—M. Armand Gautier in the chair.—B. Baillaud: Remarks on the "Annales de l'Observatoire de Paris" containing the observations made in 1892.—P. Villard and H. Abraham: A direct-reading electrostatic voltmeter for very high potentials. A simplified voltmeter capable of giving accurate readings up to potentials of 300,000 volts.—E. L. Bouvier: The Pycnogonides of the *Pourquoi Pas?* This group is well represented in the Antarctic regions, more species being found there than in the Arctic regions.—M. Jarry-Desloges: *Résumé* of the physical observations of the planet Mars made in the opposition 1909-10, with remarks on the quality of the telescopic images in various regions. The appearance and disappearance of the white polar cap corresponds with a fixed Martian date. No regularity, however, can be traced as regards the changes in form and shade of the dark spots, which, especially in the equatorial regions, do not appear to be related to the seasons. No evidence could be obtained of the existence of a liquid state resulting from the disappearance of the white polar substance.—Jules Drach: Determination of the lines of curvature of the Fresnel wave surface.—J. Hadamard: The fundamental solution of partial differential equations of the parabolic type.—L. Godeaux: Linear congruences of conics.—MM. Claude, Ferrié, and Driencourt: Radio-telegraphic comparisons of chronometers by the method of coincidences between Paris and Bizerta. It has been definitely established by these experiments that radio-telegraphic comparisons by the method of coincidences are capable of giving the difference of time between two chronometers 1000 miles apart, and with an accuracy of at least 0.01 sec.—C. Raveau: Interference fringes from a linear source of light.—M. Estanave: Photographs with changing colours. A description of a method of obtaining a photograph the colours of which change according to the angle of observation.—M. Aubert: Thermo-diffusion.—Walter König: The displacement of ultramicroscopic particles produced by very rapid sound shocks. A theoretical explanation of some experimental results recently described by MM. Henri and Lifschitz.—M. Pomey: The propagation on a telegraph line of the current due to a constant electromotive force.—Jean Perrin: The determinations of molecular magnitudes. A criticism of several methods based on Stokes's law. For the charge of the electron, the value 4.24×10^{-10} is regarded as more probable than the usually accepted 4.8×10^{-10} .—Jules Roux: The charge of the electron. Determinations on sulphur particles lead to the value 4.17×10^{-10} .—A. Blanc: The ionisation produced by phosphorus.—Georges Moreau: The ionisation of salt vapours by a corpuscular radiation.—F. Leprince-Ringuet: Study

of the state of insulation of an alternating network by means of voltmeters interposed between a pole and the earth.—Jacques **Duclaux**: The application of the kinetic theory to the study of the phenomena of catalysis.—**Echsner de Coninck**: Determination of the molecular weight of uranyl, UO_2 . The reduction of H_2UO_4 by pure hydrogen at a red heat led to a molecular weight of 270.66 for UO_2 , as against 270.5 deduced from the atomic weight 238.5 for uranium.—H. **Henriet** and M. **Bouyssy**: A method for measuring the impurities in a confined atmosphere. Metallic vessels containing a freezing mixture of ice and salt were suspended in the room, the ice being melted and weighed. The amount of reduction of a solution of potassium permanganate and chromic acid was determined, and this taken as a measure of the impurity of the atmosphere.—**MM. Taurel** and **Griffet**: The determination of the proportion of combined sulphur in a mixture of different forms of sulphur.—**Frédéric Aronsohn**: The mineral composition of the bee. Fifteen elements were determinable in the ash, including arsenic, copper, manganese, and zinc.—**Jean Pognet**: The action of the ultra-violet rays upon the green pods of vanilla. Ultra-violet light produces the odour of vanilla in fresh green pods; manganese salts accelerate this action.—**Lucien Daniel**: Biometrical researches on a graft hybrid between the pear and quince trees. After six years' cultivation, no flowers have been produced on this hybrid. A study of the leaf dentition shows the influence exerted by the subject on the graft.—A. **Marie** and **Léon MacAuliffe**: The height and general morphology of French women.—**MM. Landsteiner, Levaditi**, and **Prasek**: Attempts to transmit scarlatina to the chimpanzee.—C. **Vaney** and G. **Tainturier**: The degeneration of some larval forms of *Hypoderma bovis*.—**Carl Störmer**: The results of photogrammetric measurements of the altitude of the aurora borealis at Bosekop during February and March, 1910.

MELBOURNE.

Royal Society of Victoria, March 9.—Prof. E. W. Skeats, in the chair.—**J. Mann**: Papuan timbers, some of the properties of six species. These, known as Ulabo, Tamanau, Alaga, Madave, Kokoilo, and Iiimo, are now being exported. Mechanical tests for strength, and for calorific value, charcoal, and ash were made, and the results are tabulated. Ulabo, which is a dark heavy wood, is of engineering value and white-ant proof, while the others are useful for general joinery and, being well coloured and figured, for cabinet work.

DIARY OF SOCIETIES.

THURSDAY, MAY 18.

ROYAL SOCIETY, at 4.30.—The Properties of Colloidal Systems. II. On Adsorption as Preliminary to Chemical Reaction: Prof. W. M. Bayliss, F.R.S.—Inbreeding in a Simple Mendelian Stable Population, with Special Reference to Cousin Marriage: S. M. Jacob.—On the Direct Guaiacum Reaction given by Plant Extracts: Miss M. Wheldale.—Transmission of Amakebe by means of *Rhizopneustes appendiculatus*, the Brown Tick: Dr. A. Theiler.—On Distribution and Action of Soluble Substances in Frogs deprived of their Circulatory Apparatus: S. J. Meltzer.—The Discrimination of Colour: Dr. F. W. Edridge-Green.

ROYAL INSTITUTION, at 3.—Air and the Flying Machine. I. The Structure of the Atmosphere and the Texture of Air Currents: Dr. W. N. Shaw, F.R.S.

ROYAL GEOGRAPHICAL SOCIETY, at 5.—Research Meeting. Principles of the Construction of Vegetation Maps: Dr. C. E. Moss.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Automatic Telephone Exchange Systems: W. Aitken.

FRIDAY, MAY 19.

ROYAL INSTITUTION, at 9.—Recent Experiments with Invisible Light: Prof. R. W. Wood.

SATURDAY, MAY 20.

ROYAL INSTITUTION, at 3.—Phases of Bird Life. I. Flight: W. P. Pycraft.

MONDAY, MAY 22.

ROYAL GEOGRAPHICAL SOCIETY, at 3.—Anniversary Meeting.

ROYAL SOCIETY OF ARTS, at 8.—Rock Crystal: its Structure and Uses: Dr. Alfred E. H. Tutton, F.R.S.

TUESDAY, MAY 23.

ROYAL INSTITUTION, at 3.—The Brain and the Hand: Prof. F. W. Mott, F.R.S.

ROYAL ANTHROPOLOGICAL INSTITUTE, at 8.15.—The Classification of the Prehistoric Remains of Eastern Essex: S. Hazzledine Warren.—On a Prehistoric Skeleton from Walton-on-Naze: Dr. A. Keith.

ZOOLOGICAL SOCIETY, at 8.30.

FARADAY SOCIETY, at 8.—Recent Advances in Gas Thermometry: Dr. A. L. Day.—The High Temperature Equipment at the National Physical Laboratory: Dr. J. A. Harker, F.R.S.—The Boiling Points of Metals:

H. C. Greenwood.—The Behaviour of Silica at High Temperatures: A. Blackie.—On the Maintenance of Constant High Temperatures: Prof. Bodenstein.—On Stellar Pyrometry: M. Féry.

WEDNESDAY, MAY 24.

LINNEAN SOCIETY, at 3.—Anniversary Meeting.

ROYAL SOCIETY OF ARTS, at 8.—Architecture in America: Frank M. Andrews (New York).

GEOLOGICAL SOCIETY, at 8.—On the Geology of Antigua and other West Indian Islands, with reference to the Physical History of the Caribbean Region: R. J. Lechmere Guppy.

SOCIETY OF PUBLIC ANALYSTS, at 8.—The Composition of Milk: H. Droop Richmond.—Notes on the Analysis of Margarine: Cecil H. Cribb and P. A. Ellis Richards.—Observations on some Methods of Estimating Coconut Oil and Butter in Butter and Margarine: Cecil Revis and E. Richards Bolton.—The Estimation of Quinine as the Acid Citrate, in certain Organic Liquids: T. Cockburn and J. W. Black.—The Determination of the Amount of Dissolved Oxygen absorbed by Sewage Effluents containing Nitrite, and of the Amount of Nitrite in Sewage Effluents or Water: R. W. Clarke.—Further Analyses of Ghee: Cecil Revis and E. Richards Bolton.

THURSDAY, MAY 25.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: Experiments on the Compression of Liquids at High Pressures: Hon. C. A. Parsons, F.R.S., and S. S. Cook.—An Optical Method of Measuring Vapour Pressures; Vapour Pressure and Apparent Superheating of Solid Bromine: C. Cuthbertson and Mrs. M. Cuthbertson.—The Vacuum-tube Spectra of Mercury: Dr. F. Horton.—The Production of Characteristic Röntgen Radiations: R. Whiddington.

ROYAL INSTITUTION, at 3.—Air and the Flying Machine. II. Conditions of Safety for Floaters and Fliers: Dr. W. N. Shaw, F.R.S.

ROYAL SOCIETY OF ARTS, at 4.30.—N.W.F. Province of India: W. R. H. Merck.

SATURDAY, MAY 27.

ROYAL INSTITUTION, at 3.—Phases of Bird Life. II. Migration: W. P. Pycraft.

ARISTOTELIAN SOCIETY (at Oxford in conjunction with Mind Association).—A Symposium on the Relation of Psychology to Metaphysics: G. F. Stout and A. Smith.

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