(2) To encourage the study of languages and literary and economic subjects, and to meet the objection that the Science and Art grants tend to promote a one-sided education, it is proposed that any *bonâ fide* student attending an evening science or art class shall be able to earn a grant by attendance at University Extension courses of lectures. It is expected that the grants made on this account will only absorb an infinitesimal proportion of the total grants disbursed by the Department of Science and Art. (3) Hitherto certain restrictions as to income have existed which precluded some students from earning grants or winning scholarships. These are to be abolished; but, to prevent abuse, a regulation has been added that schools in receipt of payment must be "approved by the Department as suitable in character and financial position to receive aid from public funds," and with reference to persons eligible to hold certain scholarships and exhibitions, a provision has been added that "the Department may refuse to fill them with persons whose circumstances do not appear to warrant such aid." (4) It is suggested that the Honours examination in each subject should be divided into two parts, one less advanced in character than the other.

LORD HERSCHELL, the Chancellor of the University of London, took the opportunity of referring to the need of a teaching University, at the meeting held on Wednesday in last week for the distribution of medals and certificates. A University was not worthy of the name, he is reported by the *Times* to have said, unless it inspired a love of knowledge for its own sake. It was this conception of the mission of a University which made him desire to introduce a different element into their University, so that it should no longer be the main object of its members to obtain degrees; and if, even as regarded a minority of students, the function of teaching were added to that of examining, the idea of a University would be realised in a far higher degree than it was at present. The question of a change in their constitution had been before the country for many years, and he would not approach it in a controversial spirit, but he could not but express a hope that some step would soon be taken. The discussions of the last two years had removed many misconceptions between those who held widely different views from each other; and the progress of consideration and the interchange of views might, he thought, lead to approximation between those who appeared to stand asunder. But he was inclined to think that the questions at issue might better be solved by an independent body than by mutual concessions on the part of opposing parties. The danger of compromise was that each side might concede something which ought not to be conceded—a danger which an independent body might avoid. The main objection urged against change was that it might tend to lower the quality of degrees. If that were likely to be the result, he should be the enemy of change; but he did not believe it passed the wit of man to devise means whereby the University should become a teaching body and yet both maintain its present high standard and safeguard the interests of external students. Certainly those members of the Senate who were favourable to change were the last men who would wish to lower the degree standard. But he wished to point to a real danger. There could be nothing more fatal to the prestige and influence of their University than that there should arise by its side another University in London which should teach as well as examine; and if the choice lay between such a second University and the modification of the existing University of London, surely the latter alternative was preferable. The feeling in favour of a teaching University was so strong that in one form or another it must succeed in its aim, and surely it was wiser to look facts in the face than blindly to oppose the inevitable march of events.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, May 14.—Mr. Shelford Bidwell, President, in the chair.—Mr. W. Watson described an instrument for comparing thermometers with a standard. The thermometers to be compared are inserted together in an enclosed vapour-tube, the temperature of which can be maintained very constant at different parts of the scale. The apparatus is an adaptation of the arrangement designed by Ramsay and Young for vapour densities. It consists of a wide vertical glass tube, with a narrower tube attached at the top. The narrow tube bends downwards, and communicates with a closed vessel of considerable volume. A portion of the vertical tube is surrounded by a condensing-jacket, and a manometer-tube is inserted near the top. The object of the large vessel is to diminish errors arising from fortuitous changes of pressure, resulting from small leakages or "bumping" of the boiling liquid. Electrical heating of the bulb containing the liquid, effectually removes the "bumping." The following liquids, used consecutively, give a range of temperature from 20° C. to 120° C.: carbon bisulphide (20° to 46°), ethyl alcohol (80°), chlorobenzine (120°). The apparatus when once started required very little attention; from results submitted by the author, the variations do not exceed 0·02° C. per hour. In constructing the various parts, the difficulties of glass-blowing are reduced by making the joints of india-rubber stoppers, attached to the glass with india-rubber solution. Each joint is jacketed with glycerine. If the above liquids are used in the vaporiser, the scales of the thermometer can always be read within the tube; it is only with water that the condensed vapour gives trouble. Prof. Ayrton thought the apparatus would come into extensive use; it did away with errors arising from differences of length of thermometer stems; it left no question as to the equality of temperature of the two bulbs; and there was no probability of error due to a difference of thermal "lag" in any two thermometers. Mr. Watson, in replying to a question of Prof. Perry's, said the fact of using india-rubber joints limited the available range of temperature. Working with blown joints, Ramsay and Young had found no difficulty with their vapour-density experiments at higher temperatures.—Prof. Carey Foster read a paper, by Mr. D. K. Morris, of Zürich, on the effect of temperature upon the magnetic and electric properties of iron. The investigation relates to the measurement of the magnetic permeability, hysteresis, and electrical resistance of iron, simultaneously, at different temperatures. The specimens are formed into annular rings, made from iron strip. The strip is first lapped round with asbestos paper and mica, and then wound upon itself to the required thickness. A platinum wire is included in the mica lappings, for thermometrical purposes. Upon each annular ring are the following windings: (1) a primary magnetising coil; (2) a secondary coil connected to a ballistic galvanometer; (3) an electrical heating coil. Further, the iron strip is itself connected to a Wheatstone's bridge, for resistance measurements. The coil can be heated to 1050° C. At the higher temperatures, the surrounding air has to be freed from oxygen; this is done by enclosing the coil in a suitable vessel, and exhausting with an air-pump. When most of the air has thus been removed, the residual oxygen is absorbed by an electrically-heated iron wire. Curves are drawn representing the changes of permeability at the different temperatures; and, at the same temperatures, the corresponding hysteresis loops are plotted. The hysteresis diminishes with temperature; it nearly vanishes at about 764° C. At the suggestion of Prof. Ayrton, it was agreed that the discussion on this paper should be adjourned until the publication of the results. The paper will, therefore, be printed without delay.—Mr. Rollo Appleyard read a paper on the formation of mercury films by an electrical process. If a sheet of damp leather, or similar permeable substance, is used as a separating diaphragm between two bodies of mercury, and a current is sent through it, a film of mercury is deposited upon the surface connected to the positive pole; and the film remains on the diaphragm after removal from the apparatus. If the diaphragm is replaced in the apparatus, and subjected to a current in the reverse direction, the film vanishes from that surface, and a second film appears on the other side; that is to say, the film is always on the side of the diaphragm connected to the positive pole of the battery, and there is no film on the negative surface. Different diaphragms and films were exhibited on filter-paper, asbestos-paper, plaster of Paris, &c. A current of about one-fiftieth of an ampère, or more, is necessary. A sheet of tinfoil included between folds of filter-paper becomes perforated with pin-holes when the current is passed between the outside surfaces. This happens whether the outside electrodes are mercury or metal plates. If the top electrode should be tinfoil, this also becomes perforated as well as the included sheet. A further experiment was shown in which a gold coin is placed upon the folds of filter-paper; the current produces a gold-discoloration which penetrates the folds. This, it was suggested by the author, may help to account for the formation of metallic lodes and veins as they exist in rocks;

and they may partly explain the "inductoscripts" of Mr. F. J. Smith. Dr. S. P. Thompson said he did not know of any other example of an *anode* being more active, mechanically, than the *kathode*, except the electric arc. He was surprised that the film should appear on the positive surface. Mr. Shelford Bidwell thought selenium presented, in some of its actions, an example of the *anode* being thus active. Prof. Ayrton said that if a vessel containing a substratum of mercury amalgam was filled up with water in which gold crushings were washed, the gold descended into the amalgam. This, however, might be due partly to gravity, and partly to simple electrolysis. Mr. Appleyard said he had no definite views as to the formation of the films. He believed it to be a secondary effect of electrolysis, aided by electric osmosis. The experiments of Mr. C. K. Falkenstein upon the electric tanning of leather, and the early results of M. Perret, helped the idea of electric osmosis; they were not sufficient, however, to justify that theory without further research. A careful chemical analysis of the deposits left in the folds of filter-paper would be the best guide.

EDINBURGH.

Royal Society, May 3.—Prof. Chrystal in the chair—A paper on Dschâbir Ben Hayyân and the chemical writings ascribed to him, by Prof. Ferguson.—The seasonal changes in the pressure and temperature of the atmosphere from May to June, and November to December, by Dr. Buchan.—Dr. W. W. J. Nicol read a paper on supersaturation. After a short reference to his previous papers on supersaturation, in which the author showed that supersaturated solutions differ in none of their properties from ordinary solutions, if only the temperature be not allowed to fall below a certain point (depending upon the nature of the salt in question, and the concentration of the solution), and contact with the solid salt or with an isomorphous salt be carefully prevented, he repeated his statement that there is really no such thing as a supersaturated solution, that such solutions are in reality saturated or non-saturated solutions of what may be termed the anhydrous salt; that is to say, they contain the salt to which the *whole* of the water is similarly related, no distinction existing in solution between the water organically present as water of crystallisation, and the solvent water. The author proceeded to explain that he was forced into premature publication of his recent work on the subject, by the appearance of a paper by Ostwald in the last number of the *Zeitschrift für Physikalische Chemie* (see pp. 61-2.) In this paper, Ostwald was apparently on the verge of coming to the same conclusions as those at which the author had arrived as the result of his more recent work, thus no other course was open to him than the publication of the work in an incomplete form. The conclusion at which the author has arrived is as follows. Whenever, under the conditions of experiment, two allotropic forms of the dissolved or fused substance can exist, then supersaturation or superfusion, as the case may be, is also possible. In other words, allotropy is the cause of supersaturation. The term allotropy is used in a wider sense than usual; here it includes different crystalline or amorphous forms of a body brought about by the presence or absence of foreign molecules, and the statement is therefore applicable to cases of supersaturation involving hydrated salts, and also double salts. The experimental evidence in favour of the above, though incomplete, is already fairly large. The law is found to hold good not only with hydrated salts, but also with salts crystallising usually without water and with numerous organic compounds. Thus, allotropic forms have been found, and supersaturated solutions prepared, in the case of potassium nitrate, ammonium nitrate, silver nitrate, acetonilid, hydroquinone, acetamide, malonic acid, mandelic acid, resorcin, tartaric acid, citric acid (four modifications), and sodium chlorate, this last observed first by Ostwald. The author intimated his intention to examine further as to the limits, and to investigate the border region in which supersaturation can be terminated by shock or other mechanical means.—A paper on the geometrical investigations of the circular functions of 3θ and 5θ, by Prof. Anglin.—On some nuclei of cloudy condensation, by John Aitken, F.R.S. It has been claimed, the author said, by Helmholtz and Richarz, that "ions" were active in producing condensation in supersaturated vapour, and that these, along with dust, produced the ordinary cloudy condensation in the atmosphere. In an experiment by the author to test this conclusion, hydrogen was burned in filtered air, when it was found that, if precautions were taken to have the hydrogen pure and the air absolutely dust free, the ions lost their power of producing cloudy condensation as soon as they were cooled. The products of combustion remained free from condensed particles, when expanded, and when the products were tested by means of steam near the combustion-chamber, while they were still hot, they showed very little power of condensing. It had been shown in a previous paper that sunshine gave rise to a great increase in the number of particles under certain conditions, and experiments, recently made, were described in which it was shown that, though sunshine has no effect in producing nuclei in ordinary air, yet, if any of the so-called impurities in the atmosphere be present there in the gaseous condition, the sunlight produces a great number of nuclei. It was found that if ammonia, peroxide of hydrogen, nitric acid, nitrous acid, or sulphurous acid, were present in the air, sunlight caused the formation of a great number of nuclei of condensation, showing that if any of these gases are present in the air, clouds would be produced, though there was no dust present, if the air became saturated.

PARIS.

Academy of Sciences, May 10.—M. A. Chatin in the chair.—The President announced the losses the Academy had sustained by the deaths of M. Des Cloizeaux and Mgr. le duc d'Aumale.—Explanations of some experiments of M. G. Le Bon, by M. Henri Becquerel. Experimental evidence is given showing that vulcanite is transparent to the red and infra-red rays, which, although without action upon an unexposed plate, are capable of continuing the action of the actinic rays upon a plate which has been exposed for a very short period of time. These red rays are also capable of destroying the phosphorescence of zinc sulphide, and their passage through the vulcanite affords a complete explanation of the observations of M. G. Le Bon, the assumption of the existence of a special kind of light, "dark light," being unnecessary.—On solutions of acetone and their explosive properties, by MM. Berthelot and Vieille. This paper is a lengthy one, and gives the pressures of acetylene dissolved in acetone at different temperatures and concentrations, the conditions under which dissolved acetylene explodes; and also acetylene gas in contact with its solution in acetone.—Remarks on the explosive decomposition of solutions of acetylene, by MM. Berthelot and Vieille. In the explosive decomposition of solutions of acetylene in acetone, the latter is also broken up into carbon, hydrogen, water, and the two oxides of carbon.—On some conditions of propagation of the decomposition of pure acetylene, by MM. Berthelot and Vieille. It was found to be impossible to obtain a critical pressure below which the propagation of the explosive wave did not take place, as in a series of experiments at a given pressure the wave was sometimes produced and sometimes not.—On the employment of four-dimensional space in the study of algebraic surfaces admitting several series of conics, by M. Eugène Cosserat.—On an analytical formula relating to certain integrals of elliptic functions with respect to their modulus, by M. F. de Salvert.—On the algebraic integration of linear differential equations of the third order, by M. A. Boulanger.—On the solubility of liquids, by M. A. Aignan. The method of Alexejew for the study of the mutual solubility of liquids is criticised, and a new method suggested which leads to a different definition of the coefficient of solubility. The formulæ deduced are applied experimentally to the case of ether and water.—On multiple resonance, by M. L. Décombe. The experiments cited entirely confirm the theory of resonators put forward by Poincaré and Bjerknes.—On the diurnal variation in the direction of the wind, by M. Alfred Angot. In order to get rid of the disturbing effects of surrounding buildings, the observations were carried out at the top of the Eiffel Tower.—Basic salts of cadmium, by M. Tassilly.—Researches on strontium sulphide, and on the method of obtaining it highly phosporescent, by M. José Rodriguez Mourelo. The sulphide is prepared by heating a mixture of strontium carbonate, sulphur, sodium carbonate, sodium chloride, and bismuth sub-nitrate.—Thermal study of the sodium derivatives of acetylene, by M. Camille Matignon.—Contribution to the study of the preparation of ordinary ether, by M. L. Prunier. Some sulphonic acids are always present in addition to the sulphate and ethyl sulphate previously noted.—Action of chloral hydrate upon phenylhydrazine. Diphenylglyoxazol and its derivatives, by M. H. Causse.—On the effect of manganese in the oxidations induced by laccase, by M. Gabriel Bertrand. The presence of a manganese salt increases the

oxidising power of laccase to a remarkable extent. The author points out that the presence of minute traces of manganese in plants may be of great physiological importance.—On the fauna of the pools on the eastern coast of Corsica, by M. Louis Roule.—On a disease of orchids caused by the *Glæosporium macropus*, Sacc., by M. Mangin. After detailing the methods employed in ascertaining the presence of the *Glæosporium* in the affected plants, measures are suggested for fighting the disease, chiefly the use of β-naphthol.—On the mode of formation of the primary dunes of Gascony, by M. E. Durègne.—On the general course of glacial denudation, by M. Stanislas Meunier.—Experiments showing that the liver destroys dissolved hæmoglobin, and that it keeps the iron, by M. Louis Lapicque.—The number of poisonous principles produced by a pathogenic microbe, by M. A. Charrin. The idea is attacked that a specific pathogenic organism produces one specific poisonous principle, its toxin, and experiments are quoted to show that one and the same species of microbe can produce several pathogenic compounds. Thus the pyocyanic bacillus is shown to produce several, easily distinguishable by their pathological effects.—On barley, by M. Balland. Some proximate analyses of barley.—On the dialysis of the alkaline humates, by M. J. Dumont.—Remarks on some properties of the oxydase in wines, by M. Bouffard.—Research on caramel. Possible confusion with coal tar-colours, by M. Antonio J. da Cruz Magalhaes.

DIARY OF SOCIETIES.

THURSDAY, MAY 20.

ROYAL SOCIETY, at 4.30.—Bakerian Lecture—On the Mechanical Equivalent of Heat: Prof. Osborne Reynolds, F.R.S., and W. H. Moorby.

SOCIETY OF ARTS, at 4.30.—Kerman and Persian Beluchistan, with special reference to the Journeys of Alexander the Great and Marco Polo: Captain P. Molesworth Sykes.

CHEMICAL SOCIETY, at 8.—The Theory of Osmotic Pressure and the Hypothesis of Electrolytic Dissociation; Molecular Rotation of Optically Active Salts; Heats of Neutralisation of Acids and Bases in Dilute Aqueous Solution: Holland Crompton.—The Platinum-Silver Alloys: their Solubility in Nitric Acid: John Spiller.—A Comparative Crystallographical Study of the Normal Selenates of Potassium, Rubidium and Caesium: A. E. Tutton.

FRIDAY, MAY 21.

ROYAL INSTITUTION, at 9.—Contact Electricity of Metals: Lord Kelvin.

SOUTH-EASTERN UNION OF SCIENTIFIC SOCIETIES (Tunbridge Wells), at 3.30.—What can be done to save our Fauna and Flora from unnecessary Destruction?: Rev. J. J. Scargill and A. Rose.—How can the Technical Education Grant assist Local Scientific Societies? S. Atwood and J. W. Tutt.—Local Museums: Practical Observations on Objects and Methods: W. Cole and E. A. Pankhurst.

EPIDEMIOLOGICAL SOCIETY, at 8.

SATURDAY, MAY 22.

ROYAL BOTANIC SOCIETY, at 4.

GEOLOGISTS' ASSOCIATION—Excursion to Erith and Crayford. Director: Flaxman C. J. Spurrell. Leave Cannon Street (S. E. R.) at 2.2.

LONDON GEOLOGICAL FIELD CLASS.—Excursion to Tunbridge Wells. Wealden Beds. Leave Cannon Street, 2.23: arrive Tunbridge Wells, 3.40.

SOUTH-EASTERN UNION OF SCIENTIFIC SOCIETIES (Tunbridge Wells), at 11.—The Committees of Field Clubs: Prof. G. S. Boulger.—Current Bedding in Clay: Section at New Athletic Ground, Tunbridge Wells: Prof. H. G. Seeley, F.R.S.—Search for Coal in the South-east of England: H. E. Turner and W. Whitaker, F.R.S.—History of the Weald in special reference to the Age of the Plateau Deposit: W. J. Lewis Abbott.

MONDAY, MAY 24.

SOCIETY OF ARTS, at 8.—Design in Lettering: Lewis Foreman Day.

LINNEAN SOCIETY, at 3.—Anniversary Meeting.

TUESDAY, MAY 25.

ROYAL INSTITUTION, at 3.—The Heart and its Work: Dr. E. H. Starling.

ROYAL STATISTICAL SOCIETY, at 5.30.

ANTHROPOLOGICAL INSTITUTE, at 8.30.—A Quinary System of Notation used in Luchoo: Prof. Basil Hall Chamberlain.—Ancient Measures in Prehistoric Monuments: A. L. Lewis.—*Probable* Papers: Further Discoveries of Stone Implements in Somaliland: H. W. Seton-Karr.—The Berbers of Morocco: W. B. Harris.—Rock Paintings and Carvings of Australian Aborigines: R. H. Mathews.

ROYAL PHOTOGRAPHIC SOCIETY, at 8.—The Optical Effects of Intensification: Chapman Jones.—Some Notes on the Correct Rendering of the Colours of Flowers: H. T. Malby.

ROYAL VICTORIA HALL, at 8.30.—Growth of the Colonies in the Queen's Reign: O'Donnell.

WEDNESDAY, MAY 26.

GEOLOGICAL SOCIETY, at 8.—On Augite-Diorites with Micro-Pegmatite in Southern India: T. H. Holland.—The Laccolites of Cutch and their Relation to the other Igneous Masses of the District: Rev. J. F. Blake.

BRITISH ASTRONOMICAL ASSOCIATION, at 5.

THURSDAY, MAY 27.

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

FRIDAY, MAY 28.

ROYAL INSTITUTION, at 9.—The Isolation of Fluorine: Prof. H. Moissan.

PHYSICAL SOCIETY, at 5.

SATURDAY, MAY 29.

LONDON GEOLOGICAL FIELD CLASS.—Excursion to Sheerness. Drive to East Church, Hensbrook. London Clay. Leave Holborn Viaduct, 1.25.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—Exercises in Practical Physiology: Dr. A. D. Waller, Part 3 (Longmans).—Milk and its Products: Prof. H. H. Wing (Macmillan).—The Theory of Electricity and Magnetism: Prof A. G. Webster (Macmillan).—The Elements of Physics: E. L. Nichols and W. S. Franklin, Vol. 3 (Macmillan).—Prehistoric Problems: Dr. R. Munro (Blackwood).—A Great Agricultural Estate: The Duke of Bedford (Murray).—The Localisation of Faults in Electric Light Mains: F. C. Raphael (*Electrician* Company, Ltd.).—The Birds of our Country: H. E. Stewart (Digby).—Handbook for Jamaica for 1897 (Stanford).—Reports from the Laboratory of the Royal College of Physicians, Edinburgh, Vol. 6 (Edinburgh, Clay).—Memories of the Months: Sir H. Maxwell (Arnold).—Government of India, Department of Revenue and Agriculture. Accounts of the Trade carried by Rail and River in India, 1895-96, and the Four Preceding Years (Calcutta).—Electromoteurs et Leurs Applications: G. Dumont (Paris, Gauthier-Villars).—The Development of the Frog's Egg: Prof. T. H. Morgan (Macmillan).—Flowering Plants: Mrs. A. Bell (Philip).—First Stage Mechanics of Fluids: Dr. G. H. Bryan and F. Rosenberg (Clive).—Social Transformations of the Victorian Age: T. H. S. Escott (Seeley).—Topographische Anatomie des Pferdes: Profs. Ellenberger and Baum, Dritter Teil (Berlin, Parey).—Report on the Geological Structure and Stability of the Hill Slopes around Naini Tal: T. H. Holland (Calcutta).—Leçons sur L'Electricité et le Magnétisme: Prof. E. Mascart, tome deuxième (Paris, Masson).—Essai sur les Éléments de la Mécanique des Particules: H. Majlert, 1re Partie: Statique Particulaire (Neuchatel, Attinger).

PAMPHLETS.—Geological Survey of Canada: Report on the Country between Athabasca Lake and Churchill River: J. B. Tyrrell and D. B. Dowling (Ottowa).—Ditto: Report on Explorations in the Labrador Peninsula along the East Main, &c., in 1892, 1893, 1894, and 1895: A. P. Low (Ottawa).—Resultate aus den Beobachtungen des Veränderlichen Sternes η Aquilae: W. J. S. Lockyer (Göttingen).

SERIALS.—Transactions of the Astronomical and Physical Society of Toronto, 1896 (Toronto).—Palæozoic Fossils: J. F. Whiteaves, Vol 3, Part 3 (Ottawa).—Engineering Magazine, May (Tucker).—Proceedings of the Royal Society of Victoria, Vol. ix., new series (Melbourne).—Quarterly Journal of the Geological Society, Vol. liii Part 2, No. 210 (Longmans).—General Index to the First Fifty Volumes of the Quarterly Journal of the Geological Society, Part 2 (Longmans).—Journal of the Institution of Electrical Engineers, No. 128, Vol xxvi. (Spon).—Memoirs of the Geological Survey of India. Palaeontologia Indica, ser. xvi. Vol. 1, Part 1 (Calcutta).—Memoirs of the Geological Survey of India, Vols. xxv. and xxvi. (Calcutta).—History of Mankind: F. Ratzel, translated, Part 19 (Macmillan)—American Naturalist, May (Philadelphia).—Journal of the Franklin Institute, May (Philadelphia).—Psychological Review, May (Macmillan).—Ditto, Psychological Index, No. 3 (Macmillan).—Journal of the Chemical Society, May (Gurney).—English Illustrated Magazine, June (198 Strand).

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