

## Early Science at Oxford.

February 29, 1683/4. Dr. Wallis was pleased to inform us, that ye way commonly used in opening frozen pumps, with salt, has been known to make pumpwater, under his house, apt to curdle in boiling, and unfit for washing, which naturally is fit for use, and bears soap very well; but ye water probably will recover itself as soon as ye salt shall be drawn off.

Dr. Pit acquainted ye Society, that sallet oyl cannot be made to boyl over; this has been observed by late experiments, and will give some light to that custom of ye sugar boilers, who used to throw a piece of sewet, candle, etc into their sugar; and by these means keep it from boiling over.

Some Queries concerning the splitting of Trees by ye late great frost, were brought in by Dr. Plot: they are as follows:—Whether any of these trees have split with a noise? Whether they are split quite through, or only on one side? Whether they are all split to ye same point of ye Compass? Whether ye splitting be more common in ye Trunk, or in ye Boughs? Whether any Ice has been found in ye vessels of ye wood? Whether ye trees split be any of them dead? Whether any of ye trees split have closed since ye thaw? Whether ye Bark be loosned by ye splitting, from ye wood?

Dr. Wallis mentioned vast numbers of dead Congers, which were thrown up by ye sea, at Dim-Church wall, along ye coast of Kent, during the late hard frost, as also about eight years ago; the same was observd on ye Severn shore in Somersetshire, about twenty years ago.

March 1, 1686/7. Upon mentioning of Mr. Hooke's Discourse about the changes which he supposes to have been made upon the surface of the Earth, Mr. President observed that the latitude of Oxford is not sensibly altered in these four hundred or five hundred years last past, as appears by the Alphonsine Tables and some MSS. in Oxford, in which though there may be about one minute more, or one minute less than ye present latitude, yet that may well be attributed to the unaccurateness of the observations.—It was stated at this meeting that the age of one Mother George, now living in Oxford, is about one hundred and eleven years.

March 2, 1685/6. Dr. Plot shewed ye Society two Swedish Runestocks or Primestocks, and one book almanack; also severall old English almanacks, of which some were for families, others for private persons; some of brasse, others of wood, all perpetuall.

March 3, 1684/5. Mr. Leigh gave a farther account of ye Balsamic Earth. It will take fire at a candle, and, if tost in ye air, will burn exactly like a torche, an oyl dropping from it scarce distinguishable from ye oyl of amber. Any other earth whatsoever, if put into ye place, where this is dug, will in a year's time be exactly the same with this. 4 drops of this oyl is a present Cure for ye Colic, and may therefore in all probability be proper in those distempers, which affect the nerves.

A letter from Mr. John Aubrey, dated London Feb. 27, mentioned an opinion that some merchants were of; that beasts are generally offended at a Barbary Lion's skin. There being one of these skins in ye Musæum Ashmolianum, he desires, ye truth of this matter may be enquired into, which was ordered to be done.

March 6, 1687/8. An account was delivered of what appeared to Mr. Pit upon the dissection of a dog, that had Mercury injected into one of the jugulars. The mercury was thrown out of the blood into the cavity of the abdomen, as likewise some appearance of it in the other cavities of the body.

## Societies and Academies.

LONDON.

Royal Society, February 19.—O. W. Richardson and A. F. A. Young: The thermionic work-functions and photoelectric thresholds of the alkali metals. The photoelectric threshold for normal potassium is close to 7000 A.U., which agrees with the known wavelength of maximum activity  $\lambda_{max}$  and the equation  $\lambda_0 = \frac{2}{3}\lambda_{max}$ . Uncertain traces of a thermionic threshold agreeing with this have been found at about 200° C. in one experiment, but the thermionic thresholds usually effective at this and lower temperatures are of a much lower magnitude, even under the best vacuum conditions. A common thermionic threshold effective at about 200° C. corresponds to  $\lambda_0 =$  about 10,000 A.U. A photoelectric emission with this infra-red threshold has been got by exposing potassium to a luminous discharge in hydrogen or water vapour. This may be due to the growth of small patches normally present. There is no evidence of photoelectric activity further out in the infra-red, although there is a thermionic threshold which corresponds to  $\lambda_0 = 30,000$  A.U. The glow discharge not only brings out undeveloped thresholds, but it also augments the normal emission.—J. H. Brinkworth: On the measurement of the ratio of the specific heats using small volumes of gas. The quantity actually measured is the cooling effect in adiabatic expansion, *i.e.* the ratio of the drop in temperature to the drop in pressure. These two quantities are measured directly, the former by using a suitable platinum thermometer, and the latter from the readings on an oil gauge. The values of the ratio of the specific heats thus experimentally obtained are used for the calculation of the specific heats of air and of hydrogen. The specific heat of air at constant pressure is practically constant, and equal to 0.2395 cal./gm. °C. over the temperature range 155° to 290° A. The molecular heat of hydrogen falls rapidly from 4.88 at 290° A. to 3.30 at 90° A. None of the theoretical curves representing the variation in the molecular heat of hydrogen agrees with the experimental curve, the divergence, at some temperatures, being certainly five times greater than an outside estimate of the inaccuracy of the experimental results.—F. H. Constable: The catalytic action of copper. Part VI. Chemical reaction occurs only when an alcohol molecule is adsorbed over a characteristic arrangement of copper atoms, called a reaction centre. There is a large variation in the number of atom centres lying beneath one adsorbed alcohol molecule on various crystal faces: thus the reaction centre density varies also. The activity of the surface is controlled by the exponential activation factor, and by the reaction centre density on the surface.—Part VII. The rate of dehydrogenation of ethyl and butyl alcohols has been studied at pressures from 10 cm. of mercury to two atmospheres. The reaction velocity was found to be independent of the pressure.—V. H. Stott, Edith Irvine, and D. Turner: Viscosity measurements with glass. For the range  $10^6$  to  $10^{17}$  poises, the apparatus is a modification of the method of Trouton and Andrews, in which the resistance to torsion of a circular rod is determined. This apparatus may be readily modified so as to extend its applicability down to  $10^4$  poises. Measurements of lower viscosities down to about  $10^2$  poises depend on determinations of the rate of fall through the glass of a partially counterpoised iridio-platinum ball. Temperature uniformity in the latter case has been achieved by the use of an electrically heated "black body" furnace possessing novel features.—W. G. Palmer and F. H.

**Constable**: The catalytic action of copper, Part V. The reaction velocity-temperature curves for ethyl, *n*-propyl, butyl, *isobutyl* and *isoamyl* alcohols (which have in common the grouping  $-\text{CH}_2\text{OH}$ ) are identical within the limits of experimental error. This identity involves also the equality of the temperature coefficients and of the heats of activation. The higher alcohols caused rapid "poisoning" of the catalyst, but this secondary effect was circumvented.—**P. A. M. Dirac**: The adiabatic invariance of the quantum integrals. The postulate of the existence of stationary states in multiply periodic dynamical systems requires that if the condition of such a system, when quantised, is changed in any way by the application of an external field, or by the alteration of one of the internal constraints, the new state of the system must also be correctly quantised. It follows that the laws of classical mechanics cannot in general be true, even approximately, during the transition. During the so-called adiabatic change, which takes place infinitely slowly and regularly, so that the system practically remains multiply periodic all the time, classical laws may be expected to hold. In this case the quantum numbers cannot change, and it has been possible to deduce from the classical laws that the quantum integrals remain invariant.—**D. L. Watson**: The thermal decomposition of derivatives of oxalacetic ester: a unimolecular reaction. The decomposition, on heating, of derivatives of oxalacetic ester into a malonic ester derivative and carbon monoxide obeys the unimolecular (or simple probability) law,  $dx/dt = k(a-x)$ , and the velocity is uninfluenced by diluting with solvents or adding acidic substances, though retarded by high concentration of carbon monoxide. None of the substances could be stimulated to react by light of wave-length predicted from the Lewis-Perrin theory, or by ultra-violet radiation, which they absorb very strongly. They had energies of activation between 33,000 and 36,000 calories, and an "active life" of the order of  $10^{-14}$  second, in agreement with many other first-order changes. The velocity of decomposition of phenyl-oxalacetic ester, however, was proportional to the amount of phenyl-malonic ester formed by the change (except when the latter substance was present in excess). This law, characteristic of simple reactions in pure liquids, may be explained by the hypothesis of "reflex activation," namely, that highly energised products of reaction are largely responsible for formation of fresh "active" molecules. Here, as in all known unimolecular reactions, two species of molecules evidently take part in the change.—**K. R. Rao**: (1) On the fluorescence and channelled absorption of bismuth at high temperatures. The absorption spectrum has been photographed at temperatures of the order of  $1500^\circ\text{C}$ . Some of the absorption bands in the visible region exhibit distinctly a fine structure, showing that these are due to the triple quantification. The vapour emitted a fluorescent radiation, and the fluorescent banded spectrum ranging from  $\lambda 6570$ - $\lambda 5040$ , containing about 20 bands, shaded towards the red, has been photographed. This banded fluorescent spectrum indicates probably that the critical potentials of elements which are polyatomic are related to the molecule and not to the atom.—(2) A note on the absorption of the green line of thallium vapour. The green line of thallium consists of an intense central doublet accompanied by two satellites. Absorption by a column of non-luminous vapour indicates complete absorption of the central doublet at about  $800^\circ\text{C}$ ., at which temperature the satellite was but very feebly absorbed. The total absorption of the satellite took place at about  $950^\circ\text{C}$ .—**B. F. J. Schonland**: The passage of cathode rays through matter. Cathode rays of

velocities up to 0.55 that of light (100,000 volts) in quantities easily measurable on a galvanometer, were produced. These rays have been used to extend measurements of cathode-ray absorption to the  $\beta$ -ray region. The difference in variation of apparent absorption with velocity for different elements depends upon the fact that this is not a true absorption, since it includes the effect of the scattering back of rays on the side of incidence. The existence of a range for these rays has been established, and the values found for ranges at various velocities in aluminium are in close agreement with those calculated on Bohr's theory of absorption, which has now been tested from  $\beta = 0.20$  to  $\beta = 0.90$ , with rays of penetrating power varying in the ratio of 1 to 5000. Cathode-ray absorption is due to gradual loss of energy of moving particles by collisions with electrons in matter. An examination of the principles underlying Bohr's theory of absorption shows that interchange of energy in such collisions must take place more freely than the usual conceptions of atomic structure allow. Absorption of cathode rays of various speeds by atoms of a given element does not appear to show any discontinuities corresponding to those observed in X-ray spectra.

## PARIS.

**Academy of Sciences**, January 19.—The president announced the death of L. Maquenne, member of the section of rural economy.—**Maurice de Broglie** and **Jean Thibaud**: The exceptionally intense absorption of a radiation by the atom which has just emitted it.—**Maurice Lugeon**: Fluvial erosion. Example of the Rio Negro in Uruguay.—**Calichipulo**: The harmonic law of distribution of the errors of observation.—**d'Ocagne**: Remarks on the preceding communication.—**Enea Bortolotti**: Extension of the Beltrami-Enneper theorem to conjugated networks from  $V_2$  to  $V_3$ .—**D. Mordouhay-Boltovskoy**: The primary factors of the integral function.—**J. Dufay** and **A. Couder**: The photometric study of the total eclipse of the moon of August 14, 1924. This eclipse was observed in a clear sky at Saint-Geniez (Basses-Alpes, 1070 metres). At 10' from the centre of the shadow the stellar magnitude of the moon was, in red light ( $\lambda = 0.61\mu$ ),  $-2.8$  in October 1921, and  $-1.3$  in August 1924.—**J. H. Shaxby**: The diffusion of particles in suspension. As spheres of uniform size the cocci of the pyogenes staphylococcus were utilised, suspended in water. The value of the Avogadro number deduced from the experiments was  $59 \times 10^{22}$ .—**Beaulard de Lenaizan** and **J. Granier**: The specific inductive capacity of ice. The value 2.17 was found for the specific inductive capacity of ice, at a temperature of  $-4.5^\circ\text{C}$ ., and with a wave-length in air of 363.2 cm.—**Marcus Brutzkus**: A new mode of production of chemical reactions.—**D. K. Yovanovitch** and **J. d'Espine**: The magnetic spectrum of the high-velocity  $\beta$ -rays of thorium B+C. Seven of the high-velocity  $\beta$ -rays measured by L. Meitner are confirmed: three additional rays have been detected for which  $H\rho = 6800, 18,000, \text{ and } 40,000$ . These new rays are very faint.—**Henry de Laszlo**: The absorption of ultra-violet rays by the methyl derivatives of naphthalene. The absorption spectra of  $\alpha$ - and  $\beta$ -methyl-naphthalene, 2.6-dimethylnaphthalene and 2.7-dimethylnaphthalene were measured, and the results are given on a diagram.—**P. Vaillant**: The law of variation with temperature of the (electrical) conductivity of solid salts and its possible relations with the characteristic spectrum of the metal of the salt.—**Mme. Pierre Curie**: The estimation of radium in uranium minerals containing tantalum, niobium, and titanium. The mineral is mixed with barium sulphate, fused with

potassium bisulphate, extracted with water and filtered. The precipitate on the filter is treated with dilute hydrofluoric acid. The insoluble portion containing the radium is boiled with sodium carbonate, to convert the barium and radium into carbonates, and the latter dissolved in dilute hydrochloric acid. After concentration to ice, the emanation is removed by a current of air and estimated in the usual manner.—Mlle. Suzanne Veil: The evolution of the hydrate of nickel sesquioxide in the presence of water.—André Charriou: The use, in catalysis, of alumina which has absorbed various other substances. The decomposition of ether at 250° C. in the presence of alumina was studied. With one exception, the blue oxide of tungsten, the presence of foreign substances (SO<sub>3</sub>, P<sub>2</sub>O<sub>5</sub>, CuO, CaO, CoO) reduced the catalytic power of the alumina in this reaction.—G. Dubar: The formations of the Lias and the upper Jurassic in Asturia.—L. Eblé and J. Itié: The values of the magnetic elements at the station of Val-Joyeux (Seine-et-Oise) on January 1, 1925.—L. Blaringhem: The production of new hybrids between the wild species of Triticum and the principal cultivated wheats. Analysis of their affinities.—A. Guilliermond: The instability of forms and the permanence of the mitochondria.—P. Delauney: The glucosides of several species of native orchids.—Émile F. Terroine and Jean Roche: Heat production and respiration of the tissues *in vitro* in the homeotherms.—A. F. Roffo: The action of the Röntgen rays on cholesterol. Cholesterol, in solution, is destroyed by the action of the X-rays, but the crystallised alcohol is unchanged by this treatment.—Édouard Chatton and André Lwoff: The etiology and structure of the Spirophyra. Their relationship with the Fœttingeria. The origin and evolution of the parasitism of these infusoria.

## VIENNA.

Academy of Sciences, December 11.—H. Pettersson: Communication from the Radium Institute, No. 173. On the reflection of  $\alpha$ -particles from atomic nuclei,  $\alpha$ -particles were scattered through nearly 180° by five different elements. With three of these elements, which are known to be disintegrated, no reflected  $\alpha$ -particles were observed, even at ranges considerably smaller than those calculated by the collision-theory. With two heavier elements  $\alpha$ -rays were observed, but with much smaller ranges than would correspond to an elastic collision. Possible explanations are given on the assumption that the  $\alpha$ -particle penetrates into the nucleus. H-particles were detected after bombarding nickel and copper with  $\alpha$ -particles.—H. Handel-Mazzetti: New Chinese plants (30th communication). An index list of some 100 descriptions published during 1924 is given.—J. Albrecht: Palæontological and stratigraphical results of the journey of Dr. Ampferer and Dr. Hammer in Western Serbia in the year 1918.—M. Kohn and S. Strassmann: Ninth communication on bromophenols, bromo- and bromo-nitro-phenols.—M. Kohn and R. Marberger: Tenth communication on bromophenols: On chloro-nitro-ether and bromo-nitro-ether of hydroquinone and of tolu-hydroquinone and the mobility of the halogen atom in the same.—M. Kohn and S. Grim: Eleventh communication on bromophenols. Bromination of hydroquinone-monomethyl-ether and of nitro-hydroquinone-dimethyl-ether.

## Official Publications Received.

New South Wales. Department of Mines: Geological Survey. Mineral Resources, No. 32: The Coal Resources of the Douglas Park Area, and Tabulated List of Coal Bores, Counties of Cumberland and Camden. By L. F. Harper. Pp. 22. (Sydney: Alfred James Kent.) 1s.

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Department of Commerce: U.S. Coast and Geodetic Survey. Serial No. 277: Radio Acoustic Method of Position Finding in Hydrographic Surveys. By Comdr. N. H. Heck and E. A. Eckhardt and M. Keiser. (Special Publication No. 107.) Pp. iv+23. Serial No. 278: Velocity of Sound in Sea Water. By Comdr. N. H. Heck and Ensign Jerry H. Service. (Special Publication No. 108.) Pp. iii+27. (Washington: Government Printing Office.) 10 cents each.

Agricultural Progress: the Journal of the Agricultural Education Association. Vol. 2, 1925. Pp. 122. (London: Ernest Benn, Ltd.) 5s. net.

British Association for the Advancement of Science. Report of the Conference of Delegates of Corresponding Societies, 1924: including List of Papers bearing upon the Zoology, Botany and Prehistoric Archaeology of the British Isles. By T. Sheppard. Pp. 489-554. (London: British Association, Burlington House, W.1.)

The Carnegie Trust for the Universities of Scotland. Twenty-third Annual Report (for the Year 1923-24) submitted by the Executive Committee to the Trustees on 11th February 1925. Pp. iv+77. (Edinburgh: The Merchants' Hall.)

Bulletin of the American Museum of Natural History. Vol. 47, Art. 7: Primates collected by the American Museum Congo Expedition. By J. A. Allen. Pp. 283-499+plates 79-167. (New York City.)

The Indian Forest Records. Vol. 10, Part 11: Burma Oak and Chestnut Tans; being the Report of an Investigation from the Tannin standpoint of the different parts of the various Oak and Chestnut Trees, principally those species growing in the Maymyo and Kalaw Areas. By J. A. Pilgrim. Pp. vi+90. (Calcutta: Government of India Central Publication Branch.) 1, 1 rupees; 1s. 6d.

Nigeria. Third Annual Bulletin of the Agricultural Department, 1st July 1924. Pp. 96. (Lagos.) 5s.

Memoirs of the Colombo Museum. Edited by Dr. Joseph Pearson. Series A, No. 3: Ceylon Coins and Currency. By H. W. Codrington. Pp. viii+290+7 plates. (Colombo.) 10 rupees.

Publikation der Sternwarte in Kiel. 13: Berechnung der Ablenkungen der Lichtstrahlen in der Atmosphäre der Erde auf rein meteorologisch-physikalischer Grundlage. Von Paul Harzer. Pp. 89. 14: Gebrauchstabellen zur Berechnung der Ablenkungen der Lichtstrahlen in der Atmosphäre der Erde für die Beobachtungen am grossen Kieler Meridiankreis. Von Paul Harzer. Pp. 23. (Kiel: C. Schmidt.)

Department of Commerce: Bureau of Standards. Scientific Papers of the Bureau of Standards, No. 495: A Radiometric Investigation of the Germicidal Action of Ultra-violet Radiation. By W. W. Coblenz and H. R. Fulton. Pp. 639-680. (Washington: Government Printing Office.) 20 cents.

Annual Report of the Director, United States Coast and Geodetic Survey, to the Secretary of Commerce, for the Year ended June 30, 1924. Pp. iv+80+21 plates. (Washington: Government Printing Office.) 10 cents.

## Diary of Societies.

SATURDAY, FEBRUARY 28.

ROYAL INSTITUTION OF GREAT BRITAIN, at 3.—Sir Ernest Rutherford: The Counting of the Atoms (I).  
HULL ASSOCIATION OF ENGINEERS (at Technical College, Hull), at 7.15.—E. S. Rayner: Road Passenger Transport.

MONDAY, MARCH 2.

CAMBRIDGE PHILOSOPHICAL SOCIETY, at 4.30.  
ROYAL INSTITUTION OF GREAT BRITAIN, at 5.—General Meeting.  
SOCIETY OF ENGINEERS (at Geological Society), at 5.30.—R. I. Money: Notes on Preparing a Tender.  
ROYAL SOCIETY OF MEDICINE (Tropical Diseases and Parasitology Section), at 5.30.—Dr. H. E. Meleury: Kala Azar in China, with special reference to its Histopathology in Experimentally Infected Hamsters.  
INSTITUTE OF ELECTRICAL ENGINEERS (Western Centre) (at South Wales Institute of Engineers, Cardiff), at 6.—L. Breach and H. Midgley: Drive of Power Station Auxiliaries.  
INSTITUTE OF MECHANICAL ENGINEERS (Graduates' Section, London) (Annual Lecture), at 7.—W. H. Patchell: A Visit to America.  
ARISTOTELIAN SOCIETY (at University of London Club), at 8.—J. H. Harley: The Theory of the State.  
ROYAL SOCIETY OF ARTS, at 8.—Dr. W. Rosenbain: The Inner Structure of Alloys (III.) (Cantor Lectures).  
SOCIETY OF CHEMICAL INDUSTRY (London Section, jointly with the Institute of Chemistry (London Section)) (at Chemical Society), at 8.  
INSTITUTE OF THE RUBBER INDUSTRY (London Section) (at Engineers' Club, Coventry Street, W.), at 8.—F. Jones: Standardised Rubber-ware.  
ROYAL SOCIETY OF MEDICINE (Epidemiology, Comparative Medicine, and Disease in Children Sections), at 8.—G. P. Male, Dr. M. J. Rowlands, Dr. Stenhouse Williams, Dr. David Nabarro, Sir Layton Blenkinsop, and others: Special Discussion: The Control of Tuberculosis and the Milk Supply.  
INSTITUTE OF CHEMISTRY (Manchester Section).—Dr. A. Renshaw: Chemical Poisoning occurring amongst Industrial Workers.

TUESDAY, MARCH 3.

ROYAL INSTITUTION OF GREAT BRITAIN, at 5.15.—Prof. J. Barcroft: The Colour of the Animal Creation (IV). The Colour of Fish.  
ZOOLOGICAL SOCIETY OF LONDON, at 5.30.—E. Banks: Variation in the Colours of European Birds in relation to the Conditions under which they live.—O. Thomas, M. A. C. Hinton, and Capt. G. C. Shortridge: On Mammals collected in 1923 by Capt. Shortridge during the Percy Sladen and Kaffrarian Expedition to South-West Africa. With Field-notes by the Collector.—Dr. C. F. Sonntag: A Monograph of *Orycteropus afer*. I. Anatomy except the Nervous System, Skin, and Skeleton.—Mary L. Hett: A New Species of Trematoda (Trematoda) from West Australia.—V. S. Vinogradov: The Structure of the External