

The present report enumerates the position of all these stations, and tabulates the values of the declination, inclination and horizontal force as observed, and as reduced to the common epoch January 1, 1900. The data are also embodied in a series of charts. In the reduction to a common epoch the secular change was derived from numerous absolute observations made at Linden, Montgomery County; whilst diurnal variations were deduced from the records of the Naval Observatory, Washington. Unfortunately, owing to the disturbing action of electric trams at Washington, no satisfactory data were obtainable for the actual years occupied by the survey, and recourse was necessary to earlier records, mainly of the three years 1889 to 1891, particulars of which appear in the report. This, of course, is open to objection, on the ground that the amplitudes of the diurnal inequalities of the several elements vary from year to year. However, as both the magnetograph records and the field observations relate to years of relatively small sun-spot frequency, the objection is less serious than might appear at first sight.

Calculations are given of the probable errors in single observations with the instruments employed. The results appear fairly satisfactory in the case of the declination and inclination, but less so in the case of the horizontal force (*cf.* Table 18, p. 84). Dr. Bauer considers the weak point in the magnetometer—of the Geodetic Survey's old pattern—to have been the employment of wood in the deflection bar, and he states that the U.S. Survey is now procuring a superior type of instrument. One point that may be also worth reconsidering in this connection is the employment of 35 and 49 cms. as the two distances for deflections in horizontal force observations. Large distances have the advantage of reducing the uncertainties connected with the law of force between two magnets of finite size; but except in regions where the horizontal force is very low, distances such as 35 and 49 cms., with magnets of ordinary strength, imply small deflection angles, and the writer is inclined to think this may more than compensate for any theoretical advantage, especially in field work.

One of the interesting points discussed, and illustrated in the charts, is the existence of a considerably disturbed region near Gaithersburg, some twenty or thirty miles north-west of Washington. The abnormalities here were apparently first disclosed by special observations made with a view to the selection of a site for a magnetic observatory near Washington. The fact emphasises the dangers to which random choice of such a site may be exposed. At the end of the report there is an outline of a scheme for the complete mathematical investigation of the magnetic distribution in Maryland, but the working out of this and various other details is postponed, pending, apparently, the elaborate survey of the entire United States which the U.S. Coast and Geodetic Survey has now in contemplation. C. C.

SCIENTIFIC SERIAL.

American Journal of Science, March.—Studies of Eocene Mammalia in the Marsh collection, Peabody Museum, by J. L. Wortman. Part ii. Primates.—On ceric chromate, by P. E. Browning and C. P. Flora. An excess of chromic acid precipitates a ceric chromate of the composition $Ce(CrO_4)_3 \cdot 2H_2O$ from solutions of cerium salts. Although the sulphates of lanthanum, didymium and yttrium were present, these metals were not present in the precipitate.—The effects of changes of temperature on permanent magnets, by H. B. Loomis. After giving a historical résumé of previous work on this subject, experiments are described showing the changes in the magnetic moment of magnets of different lengths, but of the same cross section, and on the change in distribution due to change of temperature.—On the chemical composition of axinite, by W. E. Ford. Expressed as an orthosilicate, the formula is found to be $Ca_2Al_4(SiO_4)_6$, in which the calcium may be in part replaced by varying amounts of Mn, Fe, Mg, and hydrogen, while a little Fe is isomorphous with the Al.—The electrical conductivity and absorption of energy in the electrodeless discharge, by Bergen Davis.—The geological structure of New Mexican Bolson Plains, by C. R. Keyes.—Note on the marine turtle Archelon. (1) On the structure of the cara-

pace; (2) associated fossils, by G. R. Wieland.—The ionisation of water and of phosphorus nuclei, by C. Barus.—On a method of demonstrating Newton's rings by transmitted light, by H. N. Davis. If a number of wire rings of the same size be mounted in parallel planes, and dipped together in a soap solution, their planes being kept perpendicular to its surface, a series of films results through which light can be passed and caught on a sheet of paper, showing very beautiful colour phenomena.—Note on the amphibole Hudsonite previously called a pyroxene, by S. Weidman.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 26.—“An Attempt to Estimate the Relative Amounts of Krypton and of Xenon in Atmospheric Air.” By Sir William Ramsay, K.C.B., F.R.S.

In these experiments 191.1 kilograms of gaseous air were passed into a Hampson's liquefier, and 11.3 kilograms of air were liquefied. This liquid air was evaporated in a partial vacuum, until only about 200 cubic centimetres remained. The residue, consisting largely of oxygen and also containing argon, krypton and xenon, was deprived of oxygen and nitrogen by means of red-hot copper and magnesium lime, and the resulting mixture was fractionated, so as to separate the argon, krypton, and xenon. Complete separation was not achieved, but knowing the densities and volumes of the fractions of gas obtained, their relative amounts could be calculated. This method does not preclude loss of the rarer gases, but that loss, especially in the case of xenon, must have been small; the vapour-pressure of krypton at the temperature of fractionation, -195° , being only 2.8 mm., and that of xenon, 0.02 mm.

The results are reproduced in the following tabular statement:—

Percentage krypton in gaseous air, 0.000014 by weight.

Percentage xenon in gaseous air, 0.000026 by weight.

Krypton equal to 1 part by weight in about 7 millions of air; by volume, 1 part in 20 millions.

Xenon equal to 1 part by weight in about 40 millions of air; by volume, 1 part in 170 millions.

As before remarked, it is not maintained that all the krypton and all the xenon have been separated; it is likely, however, that the separation of the xenon was more perfect than that of the krypton. The results are merely brought forward as the result of a careful experiment to quantitatively isolate these gases.

As a quantity of pure krypton, sufficient for determination of density, had been collected, occasion was taken to redetermine the density of that gas, with the following result, that the value, compared with $O=16$, was found to be 40.81.

The atomic weight of krypton would accordingly be 81.62; the mean of former determinations is 81.28. This is in accordance with its position in the periodic table, which lies between bromine, 80, and rubidium, 85.

“An Inquiry into the Variation of Angles observed in Crystals, especially of Potassium-Alum and Ammonium-Alum.” By Prof. H. A. Miers, F.R.S.

The author has endeavoured to trace the changes of angle upon one and the same crystal during its growth by measuring it at intervals without moving it from the solution in which it is growing. This is accomplished by means of a telescope-goniometer in which the crystal is observed through one side of a rectangular glass trough, and the changes in the inclination of each face are followed by watching the displacements of the image of a collimator slit viewed by reflection in it.

Examined in this way an octahedron of alum (ammonium or potassium) is found to yield not one but three images from each face; and closer inspection shows that the crystal is not really an octahedron, but has the form of a very flat triakis octahedron.

When a growing crystal of alum is watched for several hours or days, it is found that the three images yielded by an apparent octahedron face continually change their position; one set fades away and is replaced by another set.

The images do not move continuously, but *per saltum*, indicating that the reflecting planes are vicinal faces which

probably possess rational indices, and must, therefore, be inclined at certain definite angles to the octahedron face; but the indices are very high numbers.

In other experiments crystals of alum were measured after growing for several hours in solution kept continually agitated in order to eliminate the action of the concentration streams. Almost no effect was produced upon the angles of the vicinal faces, which are, therefore, not due to these streams.

Every point within a crystal has at some time been a point on the surface, and has been subject to the conditions of equilibrium between crystal and solution which prevail there. It is believed by the author that a study of the vicinal planes and of the liquid in contact with them may lead to some understanding of these conditions.

In order to ascertain the composition of this liquid, its refractive index was determined by means of the same goniometer by the method of total internal reflection within the growing crystal, for alum, sodium chlorate, and sodium nitrate.

In each case the liquid in contact with the growing crystal was found to be slightly supersaturated. It was not found to exhibit double refraction even in the case of sodium nitrate.

The author suggests that vicinal faces grow upon a crystal in preference to simple forms, because the crystallising material descends upon the growing face in a shower which is not very dense.

"On a New Series of Lines in the Spectrum of Magnesium." By A. Fowler, A.R.C.Sc., F.R.A.S., Assistant Professor of Physics, Royal College of Science, South Kensington. Communicated by H. L. Callendar, F.R.S.

The paper records the appearance of faint lines at approximate wave-lengths 4511.4, 4251.0, 4106.8, and 4018.3 in the arc spectrum of magnesium when metallic poles are used. A mere inspection of the photographs suggests that these lines constitute a regular series, associated with the much stronger series described by Rydberg having wave-lengths 5528.75, 4703.33, 4352.18, 4167.81, 4058.45, and 3987.08, and this view seems to be confirmed by calculation.

A formula which has been found to give good results for series in general, namely

$$n = n_{\infty} - \frac{C}{(m + \mu)^2 - m_0}$$

gives for the two series the equations:

$$\text{"Rydberg" series, } n = 26,601.49 - \frac{107.07137}{(m + 1.2304)^2 + 2.13282}$$

$$\text{New series, } n = 26,587.4 - \frac{100.0336}{(m + 0.495)^2 + 2.38919}$$

n being the oscillation frequency *in vacuo* in each case.

The convergence frequency of the new series is as nearly equal to that of the Rydberg series as can be expected with the comparatively rough wave-lengths employed, and in each case the constant m_0 is of unusual magnitude.

It is concluded that the arc spectrum of magnesium includes two subordinate series of single lines in addition to the two well-known subordinate series of triplets. No such combination of series appears to have been previously noted in the spectrum of a metal.

"On the Dependence of the Refractive Index of Gases on Temperature." By George W. Walker. Communicated by Prof. J. J. Thomson, F.R.S.

Mascart found that the temperature coefficient of refractive index of gases always exceeded the theoretical coefficient given by Gladstone and Dale's law. In the case of air his results do not agree with those of Lorenz and Benoit, who found a coefficient which agrees with the theoretical law. The present paper gives an account of the author's experiments on air, H_2 , CO_2 , SO_2 , and NH_3 .

Jamin's interference method was used, and the accuracy obtained in the value of $\mu - 1$ was about one part in 600. The temperature coefficients obtained were substantially less than Mascart's values, but they still differ from the theoretical law.

"The Electrical Conductivity Imparted to a Vacuum by Hot Conductors." By O. W. Richardson, B.A., B.Sc. Communicated by Prof. J. J. Thomson, F.R.S.

This paper is an investigation of the conditions which determine the rate of escape of negative electricity from hot metals at low pressures.

The results of the experiments are explained on the corpuscular theory of conduction in metals. Assuming that the corpuscles which strike the surface are kept in the metal at ordinary temperatures by a surface discontinuity of potential, they will escape when their kinetic energy exceeds a certain value. Calculating in this way, the number of corpuscles which escape per second, at temperature θ , is found to be

$$N = n \left(\frac{R\theta}{2m\pi} \right)^{\frac{1}{2}} e^{-\frac{1}{2}R\theta},$$

where n = the number of free corpuscles per c.c. of the metal, R = the gas constant for one corpuscle the mass of which is m , and Φ = the work done by a corpuscle in passing through the surface layer.

The saturation current is equal to N multiplied by the charge on an ion.

The saturation current, in the case of platinum and carbon, and the current under a constant voltage, in the case of sodium, where the current could not be saturated, have been shown to vary with temperature according to a formula of type $A\theta^{\frac{1}{2}}e^{-b/\theta}$ (A and b being constants), over a large range of values. The range of current examined is:—

For platinum from 10^{-10} to 10^{-3} amperes per sq. cm.

For carbon from 10^{-8} to 2 amperes per sq. cm.

For sodium from 10^{-11} to 2×10^{-2} amperes total current.

The corresponding ranges of temperature for carbon and sodium are roughly from 1000° C. to 1600° C., and from 100° C. to 450° C. respectively.

From the values of A , the number of free corpuscles per c.c. in each conductor is calculated. In the case of platinum the number agrees with that found by Prof. Patterson by another method, but the values for the other conductors are absurdly large. Reasons for the discrepancy are assigned.

The values of the discontinuity in the potential at the surface of the metal are obtained from those of b . They are found to be: for sodium, 2.45 volts; for platinum, 4.1 volts; and for carbon, 6.1 volts. The values obtained lead to the conclusion that the work required to force a corpuscle out of a metal varies, approximately at any rate, inversely as the cube root of the atomic volume.

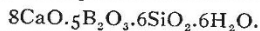
The enormous currents obtained at such very low pressures (as much as two amperes per sq. cm. at 1/600 mm. in the case of carbon) show that the leak is not produced by the interaction of gas and metal. The results also furnish a complete explanation of the Edison effect.

"On the Evolution of the Proboscidea." By Dr. C. W. Andrews.

Chemical Society, April 2.—Prof. W. A. Tilden, F.R.S., president, in the chair.—The following papers were read:—The dioximes of camphorquinone and other derivatives of isonitrosocamphor, by Dr. M. O. Forster. The four possible dioximes have been prepared in a pure state, and their principal properties ascertained; from these a number of interesting derivatives have been obtained.—Reversibility of enzyme or ferment action, by Mr. A. C. Hill. In continuation of the author's researches on this subject attempts have been made to isolate the reversible products produced by the action of enzymes on monosaccharides. The new biose *revertose* has been obtained in this way by the action of yeast ferment upon glucose, and has been characterised by the preparation of its well-crystallised phenylosazone.—Discoloured rain, by Mr. E. G. Clayton. The author has examined the terra-cotta coloured deposit obtained from the rain which fell generally in the south of England on Sunday, February 22, and finds that this deposit was merely wind-borne dust from the roads and lanes of Wessex. Dr. Mill, in the discussion which followed, stated that fifty specimens collected in various parts of Europe were now being examined by the officials of the Geological Survey, and that a preliminary examination of some of these samples led him to believe that the explanation of the presence of this solid matter in the rain was less simple than Mr. Clayton had suggested.—The absorption spectra of nitric acid in various states of concentration, by Prof. W. N. Hartley. Photographs of the spectra of nitric acid solutions indicate

that in strong solutions there exists either a polymeride of the acid or the compound $N_2O_5 \cdot H_2O$; in less concentrated acid there probably exists a compound of the formula $(HNO_3)_3 \cdot H_2O$, whilst in more dilute solutions hydrates of the acid are present.—Salts of an isomeric mercaptoid form of thioallophanic acid, and a new synthesis of alkyl iminothiocarbamates, by Dr. A. E. **Dixon**.—Derivatives of *o*-aminobenzophenone and *p*-aminobenzophenone, by Dr. **Chattaway**.—Action of caustic alkalis on cinnamic acid dibromide and its esters, by Messrs. **Sudborough** and **Thompson**. *α*-Bromocinnamic and bromoalocinnamic acids are produced together in this reaction, and may be separated by conversion into the respective barium salts.—The composition of Caro's acid, by Dr. T. S. **Price**. The author finds that on revising his work on the basicity of this acid, using sodium hydroxide in place of barium hydroxide as a titrating agent, it may probably be represented by the formula suggested by Armstrong and Lowry.

Mineralogical Society, March 24—Dr. Hugo Müller, F.R.S., president, in the chair.—Dr. A. **Hutchinson** described some remarkably interesting experiments which he had made on the diathermancy of antimonite. A cleavage flake of antimonite 0.29 mm. thick and 20 sq. mm. in area, perfectly opaque to light, was placed between crossed nicols and exposed to the radiation from a limelight. The plate was somewhat transparent to radiant heat, and the amount transmitted was measured by Boys's radiomicrometer. No heat was transmitted when the planes of symmetry of the crystal coincided with the planes of polarisation of the nicols, but the maximum effect was produced on the radiomicrometer when the plate was turned through 45° in its own plane. The results so far arrived at are in harmony with the orthorhombic symmetry attributed to antimonite.—Mr. J. B. **Scrivenor** described the occurrence of magnetite in the Upper Bunter Sands at Hinksford, near Stourbridge, and of anatase in the Trias of the midlands. The crystals of magnetite, measuring on an average 0.067 mm., were in cubes or octahedra. The mode of occurrence and the presence of a single set of striations parallel to the cube edge suggest that they are pseudomorphous after iron pyrites. The anatase, in crystals from 0.025 mm. to 0.06 mm., is found more abundantly in the Keuper than in the Bunter. The crystals show the forms {111} and {001}, and according to the predominance of either form are pyramidal or tabular in habit. Many of them are attached to leucoxene derived from ilmenite or sphene. The anatase has been formed *in situ*, after the deposition of the sandstone, as a decomposition product of other titaniferous minerals.—Prof. W. J. **Lewis** described a large crystal of sartorite from the Binnenthal measuring $4'' \times 1'' \times \frac{1}{2}''$. An analysis by Mr. Jackson gave the following result:—Pb=42.93, S=25.32, As=31.11. Prof. Lewis also discussed some peculiar twinned crystals of copper-pyrites and cerussite.—Mr. W. B. **Giles** contributed notes on howlite and other borosilicates from the borate mines of California. One of these, for which the author proposes a new name, is a white amorphous mineral resembling in appearance pandermite; the results of two closely agreeing analyses of material from different localities corresponded to a formula



Mr. Giles also described a tantalite from Green Bushes, W. Australia, which contained 85 per cent. of tantalum with very little niobic acid.—Mr. J. Allen **Howe** exhibited specimens of peculiar pseudo-stalactitic growths of calcite from the north of England.

Geological Society, March 25.—Prof. Charles Lapworth, F.R.S., president, in the chair.—On a new species of Solenopsis from the Pendleside Series of Hodder Place, Stonyhurst (Lancashire), by Dr. Wheelton **Hind**.—Note on some Dictyonema-like organisms from the Pendleside Series of Pendle Hill and Poolvash, by Dr. Wheelton **Hind**.—The geology of the Tintagel and Davidstow district (northern Cornwall), by Mr. John **Parkinson**. The country described and mapped extends from the coast eastward towards St. Clether. In the eastern part it extends to the Brown Willy mass of granite. Except in the southern coast region, the strike is fairly uniform in an east-south-easterly and west-north-westerly direction, the beds having a northerly dip; but north and south of Tintagel Head the higher members

appear, greatly faulted. The most distinctive rocks, utilised as a datum for mapping, are a group of ashes and lavas. Bluish-black slates and fine laminated quartzose beds overlie and underlie this volcanic series. The remaining rocks are phyllites, closely resembling those from the Ardennes. The author divides them into four groups. The highest of these (Tredorn Beds) overlies the uppermost division of the Blue-Black Slates. The beds underlying the Lower Blue-Black Slates (Hallwell Cottage Beds) are banded phyllites, with quartzose laminae. The underlying phyllites (Penpethy Beds and Slaughterbridge Beds) contain no distinctive mineral. Taken as a whole, the phyllites consist of a sericitic and chloritic groundmass containing unoriented crystals of white mica, micaceous ilmenite, hæmatite, and minor quantities of tourmaline and rutile.

Linnean Society, April 2.—Prof. S. H. Vines, F.R.S. president, in the chair.—The minutes of the general meeting of March 19 were read and confirmed.—Mr. A. Gepp read a paper on behalf of the author, Mrs. Antony **Gepp** (Ethel S. Barton), entitled "List of Marine Algæ collected at the Maldive and Laccadive Islands by Mr. J. Stanley Gardiner." The author stated that there appears to be no record of the marine Algæ of these islands. The list now presented includes one new species, *Liebmannia Laccadivarum*, but the bulk of the remainder are already known from the Indian Ocean.—Dr. D. T. **Gwynne-Vaughan** gave a lantern demonstration of his paper on the comparative anatomy of the Cyathecæ and other ferns.

PARIS.

Academy of Sciences, April 6.—M. Albert Gaudry in the chair.—Memorial notice of Sir George Gabriel Stokes, by M. **Mascart**. Sir George Gabriel Stokes had been correspondent of the Academy of Sciences for the department of physics since 1879. He was nominated as a Foreign Associate in 1900.—On animal heat, by M. A. **Chauveau**. A consideration of problems raised by a note of Lord Kelvin's on the regulation of temperature of warm-blooded animals. It is shown that the organism is much less resistant to a raised than to a lowered external temperature. A fall of 60° C. in the external temperature has no effect on the temperature of the body, whereas a rise of 60° C. soon causes the body temperature to increase several degrees, and death quickly follows.—Note by M. **Laveran** referring to M. Chauveau's communication. It is pointed out that man is much more competent to withstand an increase of exterior temperature than most animals. This is borne out by the author's experience at Biskra, where the temperature sometimes reaches 50° C. in the shade.—On Anopheles and malaria, by M. A. **Laveran**. Mosquitoes from paludal districts in all parts of the world have been examined by the author, and it is proved that almost invariably abundance of Anopheles coincides with the prevalence of malaria. Anopheles may be met with in healthy localities, as they are not in themselves dangerous, only becoming so when infected from malarial patients. The different species of Anopheles are not equally effective in spreading the disease.—On waves of the first order in a vitreous medium, by M. **Duhem**.—Report of the Equatorial Geodesic Commission. The work of the commission in the Andes was much hindered by the exceptional weather conditions. At the post of Mirador, altitude 4000 metres, observations were nearly impossible for a period of three months, owing to incessant fogs and storms.—On the volcanic conditions of Martinique; result of the mission to Martinique, by M. A. **Lacroix**.—The fiery clouds produced in the eruption of Mont Pelée have been observed by the author; they consist of large volumes of hot gases and vapours, carrying great quantities of fragmentary products, and are the principal agent of destruction.—On a remarkable property of several developments employed in mathematical analysis, by M. **Stekloff**, presented by M. Émile Picard.—On a new transformation of curved surfaces, by M. C. **Guichard**.—On a form of the relation $\phi(p, v, t) = 0$, by M. Honoré **Moulin**, presented by M. E. H. Amagat.—On a new method of rendering horizontal the optical axis of a telescope, by M. Alphonse **Berget**, presented by M. Lippmann.—On observations of atmospheric electricity at the summit of Mont Blanc, by M. G. **le Cadet**, presented by M. Jannsen. The author finds that the diurnal variation of potential in fine weather at the summit of Mont

Blanc shows a simple oscillation, maximum about 3-4 p.m., minimum about 3 a.m.—On magnetic dichroism of liquids, by M. Georges **Meslin**. Solutions of bichromate of potassium in turpentine and in carbon disulphide have the property of absorbing to unequal extents the rays parallel to, and perpendicular to, the magnetic field. This result is exhibited by the whole extent of the spectrum.—On the colour of mercuric iodide at different temperatures, by M. D. **Gernez**. The author has been able to keep yellow mercuric iodide unchanged for years in a vacuum. If the yellow crystals be cooled down from above 126° C. to about -192° C., they become almost white, while the red crystals at this temperature become orange-yellow.—On derivatives of plumbic acid, by M. Alb. **Colson**. Lead tetracetate may be obtained by the action of chlorine on a solution of lead acetate in acetic acid.—On the preparation of the crystalline sulphides of zinc and cadmium, by M. Georges **Viard**. If the vapours of zinc and cadmium chlorides, diluted with carbon dioxide, be passed over the sulphides of various metals, e.g. SnS, crystalline ZnS or CdS is formed.—On the action of alkaline earth bases on salts of the pyrogallol sulphonic acids, by M. Marcel **Delage**. If a solution of Ba(OH)₂ be added to one of barium, strontium, or calcium pyrogallol sulphonate, coloured bodies of complex constitution are formed.—On organic heats of combustion, by M. P. **Lemoult**. The theoretical and calculated values for the sixty cases given are very concordant.—On nitrated cellulose, by M. Léo **Vignon**. The product obtained gave analytical results agreeing very well with an oxycellulose trinitrate.—Association of bacteria with *Ascobolus*, by M. **Molliard**.—Action of calcium oxalate in the nutrition of plants, by M. **Amar**. The crystals of calcium oxalate become less numerous as the distance from the vein of the leaf increases; they are probably a product of excretion.—On the localisation of æsculin and of tannin in the chestnut tree, by M. A. **Goris**. The reaction made use of to detect æsculin is the blood-red colour produced by the consecutive action of concentrated nitric acid and ammonia.—On new fossil fungi and algae of the coal period, by M. B. **Renault**.—On the Lycopodiaceæ of the Trias in Lorraine, by M. P. **Fliche**.—On nephrotoxins, by M. H. **Bierry**. If the bruised kidney of a dog be introduced into the blood of a rabbit, the blood becomes powerfully toxic, and produces strong albuminuria when injected into a dog. Nucleo-albumins derived from the kidneys produced the same effects.—On the speed of flow of subterranean waters, by MM. E. **Fournier** and A. **Magnin**.

DIARY OF SOCIETIES.

THURSDAY, APRIL 16.

MATHEMATICAL SOCIETY, at 5.30.—Exhibition of the Logo-Logarithmic Slide-rule: C. S. Jackson.—On the Deduction of Schlämilch's Series from a Fourier Series, and its Development into a Definite Integral: R. F. Gwyther.—On those Functions which are Defined by Definite Integrals with not more than Two Singularities: E. T. Whittaker.—Note on Exact Solutions of the Problem of the Bending of an Elastic Plate under Pressure: Prof. A. E. H. Love.—Relations between Points (in a Plane) having Conjugate Complex Coordinates: Prof. A. Lodge.

LINNEAN SOCIETY, at 8.—On some Points in Connection with the Ordinary Development of *Vaucheria* Resting Spores: Dr. H. Charlton Bastian, F.R.S.—The Labial and Maxillary Palpi in Diptera: W. Weschê.—On Freshwater Rhizopods and their Classification: Prof. G. S. West.

FRIDAY, APRIL 17

EPIDEMIOLOGICAL SOCIETY, at 8.30.—The Seasonal Incidence of Typhoid Fever and Summer Diarrhoea: Dr. J. T. C. Nash.

SATURDAY, APRIL 18

GEOLOGISTS' ASSOCIATION.—Excursion in Conjunction with the Geological Section of the Croydon Natural History Society. Directors: N. F. Roberts and W. Whitaker, F.R.S. Members meet at New Cross Station (L. B. & S. C. R., down platform), at 3.21 p.m. Object: To see the Reopening of the Cutting S. of the Station, showing the Junction of the London Clay with the Beds below.

MONDAY, APRIL 20.

VICTORIA INSTITUTE, at 4.30.—The Geological Conditions of the West Indian Volcanoes: Prof. J. W. Spencer.—On Volcanic Action, with Special Reference to the Recent Eruptions in the West Indian Islands: Prof. J. Logan Lobley.

TUESDAY, APRIL 21.

ROYAL INSTITUTION, at 5.—The Blood and some of its Problems: Prof. Allan Macfadyen.

ROYAL STATISTICAL SOCIETY, at 5.—Agricultural Wages in England and Wales during the last Fifty Years: A. Wilson Fox.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Decay of Metals: James T. Milton and William J. Larke.

ZOOLOGICAL SOCIETY, at 8.30.—On the Geographical Distribution of Spiders of the Order Mygalomorphæ: R. I. Pocock.—On some Mammals

collected by Capt. H. N. Dunn in the Soudan: Oldfield Thomas, F.R.S.—Linnæus and Hunter on Feather-tracts: Henry Scherren.

WEDNESDAY, APRIL 22.

SOCIETY OF ARTS, at 8.—Modern Bee Keeping: Walter F. Reid.

CHEMICAL SOCIETY, at 5.30.—The Velocity and Mechanism of the Reaction between Potassium Ferricyanide and Potassium Iodide in Neutral Aqueous Solution: F. G. Donnan and R. de Rossignol.—A Microscopic Method of Determining Molecular Weights: G. Barger.—Note on the Spectrum of Pilocarpine Nitrate: W. N. Hartley.—Isomeric Change of Dipropionanilide into Propionyl- β -aminopropiophenone: F. D. Chattaway.—Note on the Formation of the Di- and Hexamethylammoniacal Chlorides of Cadmium: W. R. Lang.

THURSDAY, APRIL 23.

ROYAL INSTITUTION, at 5.—Hydrogen: Gaseous, Liquid and Solid: Prof. Dewar, F.R.S.

SOCIETY OF ARTS, at 4.30.—The Province of Sind: Dr. Herbert M. Birdwood.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Distribution Losses in Electric Supply Systems: A. D. Constable and E. Fawcett.—A Study of the Phenomenon of Resonance in Electric Circuits by the Aid of Oscillograms: M. B. Field. *And, if time permit.*—Divided Multiple Switchboards: An Efficient Telephone System for the World's Capitals: W. Aitken.

FRIDAY, APRIL 24.

ROYAL INSTITUTION, at 9.—Some Recent Investigations on Electrical Conduction: The Hon. R. J. Strutt.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Bacterial Sewage-Disposal Works, at Ash, Dover: H. S. Watson.

PHYSICAL SOCIETY, at 5.—An Electrical Thermostat: H. Darwin.—Dimensional Analysis of Physical Quantities and the Correlation of Units: A. F. Ravenshear.—Note on the Dimensions of Physical Quantities: R. J. Sowter.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Address by the president, J. H. Wicksteed.—The Education of Engineers in America, Germany and Switzerland: Prof. W. E. Dalby.

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