analysis of the courses of study in physics in the different institutions from which data were received. In his circular to laboratory directors, M. Weinberg tabulated some 910 typical practical exercises in physics and requested that those worked in the laboratories might be underlined. It has thus been possible to institute an instructive comparison between the methods of different countries. About four hundred physical laboratories, having five hundred professors and eight hundred demonstrators or assistants, are recorded for the whole of the institutions for higher education in the world. In about one-fifth of these, practical work in physical manipulations is not carried on; in the rest, there are about 25,000 students who pass eight hours a week in the laboratories during three semesters. In these four hundred hours passed in the laboratory a student, on the average, performs sixty different experiments, or about two-thirds of the work for which the laboratory makes provision.

SCIENTIFIC SERIALS.

American Journal of Science, October.—An experimental investigation into the existence of free ions in aqueous solutions of electrolytes, by Julius Olsen. The well-known experiment of Ostwald and Nernst, which has been held to prove experimentally the existence of ions in solution, is criticised, and it is held that the conclusion arrived at does not necessarily follow, and that further proof is needed. Experiments are described which show that an electrolyte which has never been acted upon by a current behaves as if it contained particles charged with electricity which are free to move, and these particles have not been produced by a current. This corresponds to the definition of free ions.—On the solution of problems in crystallography by means of graphical methods, based upon spherical and plane trigonometry, by S. L. Penfield. It is shown that with the addition of certain stereographic scales and protractors to a set of ordinary drawing instruments, the lengthy calculations usual in determining the crystallographic constants can be avoided or, as an alternative, checked. Several illustrated examples of the mode of application of this method are given.—The estimation of bromic acid by the direct action of arsenious acid, by F. A. Gooch and J. C. Blake. It is shown that bromates may be satisfactorily estimated by the direct action of arsenious acid, the few apparent discrepancies which were found being traced to the presence of chlorate as an impurity in the bromate.—Solubilities of some carbon compounds, the densities of their solutions, by Clarence L. Speyers. Seven or eight carbon compounds of different types were examined in various solvents, including water, methyl, ethyl and propyl alcohols, chloroform and toluene. The results are compared with those calculated from Schroeder's formula, but the agreement is not good.

Transactions of the American Mathematical Society.—Vol. iii. No. 3 (July).—L. E. Dickson, on the group defined for any given field by the multiplication table of any given finite group. The subject of this paper is much the same as that of Burnside's in *Proc.* L.M.S. xxix.; the results, however, are obtained by a different method, which does not involve the theory of continuous groups. The paper illustrates the importance of Frobenius's discovery of the group determinant. Two examples are given.—O. Stolz, postscript to a previous article on rectification of curves. A comparison is made with Jordan's treatment of the same theory.—O. Bolza, proof of the sufficiency of Jacobi's condition for a permanent sign of the second variation in the so-called isoperimetric problems.—H. E. Hawkes, on hypercomplex number systems. The author develops the methods of Peirce, and shows that they give an enumeration of all systems in less than six units which have moduli in more than one idempotent unit. The systems for five units with two idempotent units are worked out in detail. A discussion of nilpotent systems follows.—W. B. Fite, on metabelian groups.—L. P. Eisenhart, on conjugate rectilinear congruences.—D. N. Lehmer, constructive theory of the unicursal plane cubic by synthetic methods.—L. E. Dickson, on the groups of Steiner in problems of contact (continued from the January number).

Bulletin of the American Mathematical Society (2) ix., No. 1 (October).—O. Bolza, examples in the calculus of variations.—E. R. Hadrick, on the sufficient conditions in the calculus of variations. A convenient summary, based on lectures by Hilbert.—E. B. Wilson, reviews of recent books on mechanics (Föppl, Volkmann, Picard).—E. V. Huntington, on a new edition of Stolz's "Allgemeine Arithmetik," with an account of Peano's definition of number.—E. J. Wilczynski, an obituary notice of Fuchs.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, October 31.—Prof. S. P. Thompson, president, in the chair.—A paper on the existence of a relationship between the spectra of some elements and the squares of their atomic weights, by Dr. W. M. Watts, was read by Prof. Everett. The author has detected two kinds of relation between the spectra of some allied elements. In the first kind, which is illustrated by comparisons between zinc, cadmium and mercury, and also between gallium and indium, the differences between the oscillation frequencies of certain lines of one element are to the differences between the oscillation frequencies of the corresponding lines of another as the squares of their atomic weights. In the second kind, the relation is not between two, but between three spectra, and is illustrated by the trio potassium, rubidium and cæsium, as well as by the trio calcium, strontium and barium. The element of greater atomic weight has the smaller frequency, and, in comparing corresponding lines, one from each of the three spectra, the differences of frequency are proportional to the differences between the squares of the atomic weights. If each of the spectral lines in question is represented by a point the coordinates of which are "frequency" and "square of atomic weight," the three points which represent three corresponding spectral lines will lie on one straight line in the diagram, and these straight lines will be parallel for all the components of a given set of corresponding groups. When a similar mode of plotting by points is employed to exhibit the first kind of relation, the joins of corresponding points meet in a point which lies on the axis of frequencies, in other words, on the line of zero atomic weight. This relation was indicated by Ramage about a year ago as holding for corresponding doublets and triplets.—A paper on the size of atoms was read by Mr. H. V. Ridout. This investigation deals with the size of dissociated atoms, or ions, and the results obtained refer to a dissociated atom as the smallest quantity of matter which can take part in an electrolytic action. The element chosen is hydrogen, and the author concludes that, in round numbers, 114½ million atoms are necessary to form a line one centimetre long. The method employed consists in finding a pair of spheres which would be charged by the quantity of electricity known to be necessary to electrolyse a given quantity of the body under examination—in this case water—to the known difference of potential of its ions. From this the size of the atoms is deduced, subject to certain assumptions enumerated and discussed in the paper. Lord Kelvin remarked that he had often concerned himself with the size of atoms, and pointed out that the value obtained by the author for the diameter of a hydrogen ion was almost exactly one-half of that which he had obtained for the diameter of a molecule of hydrogen. The fact, however, might be a coincidence. He had dealt with a sphere which would have the same effect as a double atom of hydrogen. While avoiding the assumption that atoms are hard and spherical, it was usual to treat them as such for purposes of calculation. The paper was an important one, but there were many assumptions which required looking into. Lord Kelvin said that, in dealing with the subject of atoms, it was necessary to consider the atoms of electricity. The atomic theory of electricity, now almost universally accepted, had been thought of by Faraday and Clerk-Maxwell and definitely proposed by Helmholtz. The atoms of electricity were very much smaller than the atoms of matter, and permeated freely through the spaces occupied by these greater atoms and also freely through space not occupied by them. An atom of electricity in the interior of an atom of matter experienced electric force towards the centre of the atom. We were forced to conclude that every kind of matter had electricity in it, and Lorenz had named electricity as the moving thing in atomic vibrations. If the electrions, or atoms of electricity, succeeded in getting out of the atoms of matter, they proceeded with the velocity of light and the body was radioactive. It was therefore not surprising that some bodies showed radioactive properties, but rather surprising that such properties were not shown by all forms of matter. Our knowledge of this subject,

which originated with the discovery of the Becquerel rays, had been greatly advanced by the experiments carried out at the Cavendish Laboratory, and he had no doubt that in the next two or three years much light would be thrown upon this important matter.—Prof H. L. Callendar exhibited some vacuum calorimeters. Three of the calorimeters were for the determination of the specific heat of mercury, water and steam respectively by the steady-flow method. The fourth was a vacuum-jacketed Bunsen calorimeter. Prof. Callendar gave some details of the instruments and described the method of using them.—Miss A. Everett exhibited some photographs of cross-sections of hollow pencils formed by oblique transmission through an annulus of a lens. The direct rays of an arc light were allowed to pass through an annulus of a convex lens tilted to an angle of 45° with their direction and placed at a distance of about twice its focal length from the arc. The photographic plate was placed at right angles to the beam, and a series of exposures was made at gradually increasing distances from the lens. Two series of photographs were shown, the first series from a plano-convex lens with one annulus and the second from a double convex lens with two annuli.

Zoological Society, November 4.—Mr. G. A. Boulenger, F.R.S., vice-president, in the chair.—Dr. C. W. Andrews gave an account, illustrated by lantern slides, of the palæontological discoveries made by himself and Mr. H. J. L. Beadnell during their recent visit to the Fayum, Egypt.—A communication was read from Mr. R. Shelford dealing with the mimetic insects and spiders of Borneo and Singapore.—Mr. C. Tate Regan read a paper on the classification of the fishes of the suborder Plectognathi.—A communication from Lieut.-Colonel J. M. Fawcett contained notes on the transformations of the butterfly *Papilio dardanus* and the moth *Philampelus megaera*, and descriptions of two new species of moths under the names *Rabdosia clio* and *Dermaleipa daseia*.—Mr. Oldfield Thomas read a paper on the mammals collected by Mr. Edward Degen during his recent expedition to Lake Tsana, Abyssinia.—A communication was read from the Hon. Walter Rothschild, in which he stated his opinion that the elk described by Mr. Lydekker as *Alces bedfordiae* was, if not a valid species, a distinct subspecies, and not a variety as had been supposed by Mr. H. J. Elwes.

CAMBRIDGE.

Philosophical Society, October 27.—Prof. Macalister, president, in the chair.—A case of extreme visceral dislocation, with remarks on the functional interpretation of the agminated glands of the intestine, by Dr. E. Barclay-Smith.—Notes on the genus Liparis, by Mr. J. J. Lister. Among other points, attention was drawn to the difference between the conspicuous satiny-white colouring of the three species *Porthesia chrysorrhaea*, *P. auriflua* and *Liparis salicis* and the quiet buffs, browns and blacks of the other members of the family, conforming closely with their environment; and it was pointed out that there is a considerable body of evidence showing that the conspicuous species are noxious to other animals, both in the larval and adult state, by reason of the urticating properties of the hairs.—Notes on the anatomy of *Macrozamia heteromera*, by Miss A. Robertson.—Further experiments on radio-activity from rain, by Mr. C. T. R. Wilson. In a paper read before this Society on May 5, experiments were described which showed that a vessel, in which freshly fallen rain has been evaporated to dryness, shows radio-active properties lasting for a few hours only. Many samples of freshly fallen rain have since that date been tested both here and at Peebles, and all have shown this effect. The magnitude of the effect obtained from a given quantity of rain has nearly always been of the same order, whether the rain has consisted of large or small drops, and whether it has been collected by day or by night, at the beginning of a shower or after some hours of continuous heavy rainfall. Once, however, during a thunderstorm an abnormally large effect was obtained. The radio-activity is obtained equally well, whether the rain is boiled down in platinum or porcelain vessels. It is not destroyed by porcelain vessels. It is not destroyed by heating the vessel to dull redness; in this, as in other points, it resembles the induced radio-activity obtained on negatively charged wires. From 190 c.c. of rain a precipitate was obtained sufficiently radio-active to increase the ionisation within the testing vessel to about 100 times its normal value; to enter the vessel the rays had to penetrate aluminium about 0·00032 cm. in thickness. The intensity of the radio-activity falls to about one-fourth of its initial value in an hour, like that obtained by evaporation. Similar precipitates formed in tap-water or in rain-water that has stood for twenty-four hours are quite inactive.

MANCHESTER.

Literary and Philosophical Society, November 4.—Mr. Charles Bailey, president, in the chair.—Mr. Francis Jones read a paper on the action of alkalis on glass and on paraffin, in which he pointed out that, while it is generally acknowledged that alkalis in course of time act on glass, there is considerable difference of opinion among chemists as to whether this action interferes with the well-known test for carbon dioxide in air, generally known as Pettenkofer's, but which was first described by Dalton in a paper read before this Society in 1802. Solutions of lime, strontia and baryta of known strength were left in glass bottles at the ordinary temperature for several months, and the strength of each was ascertained from time to time. It was found that the lime water lost strength more rapidly than the others, and that baryta could be kept in glass bottles for a period of twenty months without suffering any material loss in strength. Similar solutions were left in contact with finely divided silica and with powdered glass, and again it was found that lime water acted on these bodies more rapidly than the other two. The action on glass bottles, however, is not so rapid as to prevent any three of these alkaline solutions being used for Pettenkofer's test. It has been suggested that bottles used for this test should be coated with paraffin wax to prevent the contact of the alkaline liquid with the glass, but the author shows that lime, strontia and baryta lose strength in contact with paraffin, the action of baryta being much more energetic than that of either lime or strontia. Some baryta solution in contact with paraffin for five months was very nearly neutral at the end of that period. Consequently, the storing of standard baryta solutions in paraffined bottles is quite inadmissible.—Sir W. H. Bailey exhibited the working model of the switchback centrifugal railway invented and made by Richard Roberts.—Mr. W. E. Hoyle exhibited some coloured photographic lantern slides prepared by the Sanger Shepherd process.

PARIS.

Academy of Sciences, November 3.—M. Bouquet de la Grye in the chair.—On two Trypanosomes of Transvaal cattle, by M. A. Laveran. Details are given of the mode of growth and multiplication of *Tr. Theileri*, the cause of the cattle disease known as Galziekte. Another Trypanosome, found by M. Theiler in the blood of an ox, is regarded by the author as a new species, to which the name of *Tr. transvaaliense* is given.—On the equality of the velocity of propagation of the X-rays and of light in air, by M. R. Blondlot. On the supposition that the velocities of the X-rays and the Hertzian waves are equal, it can be predicted that the reinforcing effect of an X-ray tube upon a spark discharge ought to pass through a maximum for a certain position of the tube with regard to the spark, and this conclusion has been confirmed by experiment. The same hypothesis allows of the calculation in advance of the displacements that the position of the tube corresponding to this maximum ought to undergo in consequence of changes in the conducting wires or in the detonator. This was also confirmed experimentally, one method giving for the ratio of the velocities 0·97 and the other 0·93. The whole of the experimental facts lead to the conclusion that the velocity of propagation of the X-rays is equal to that of the Hertzian waves or of light in air.—On some recent sunsets, by M. Perrotin. The recent sunset glows are compared with the similar ones in 1883, and the hypothesis of their volcanic origin is considered. It is pointed out that the phenomena occurred in the same month in both years, which would tend to suggest that their origin was rather due to meteorological conditions than to after effects of volcanic eruptions.—The analysis of nine specimens of air collected in the galleries of a coal mine, by M. Nestor Gréhaut. The carbonic acid was found to vary between 1·0 and 1·8 per cent., methane between 3·5 and 7·5 per cent., and oxygen between 16·1 and 18 per cent. Attention is drawn to the high percentage of marsh gas, which in three cases was present in sufficient quantity to form an explosive mixture.—On the monographic resolution of the triangle of position for a given latitude, by M. Maurice d'Ocagne.—On uniform transcendentals defined by differential equations of the second order, by M. R. Liouville.

—On the formation of liquid drops and the law of Tate, by MM. A. Leduc and P. Sacerdote. A reply to the criticisms of MM. P. A. Guye and L. Perrot.—Remarks on a recent note by M. Ponsot on the electromotive force of a thermoelectric couple, by M. H. Pellat.—On the electrical resistance of lead sulphide at very low temperatures, by M. Edmond van Aubel. The resistance of the lead sulphide was found to diminish as the temperature was lowered. The experiments were carried out over a range of temperature between the boiling point of liquid air and the ordinary temperature of the room. The results are not in accord with the previous work of Guinchant and Streintz.—On a chlorosulphate of aluminium, by M. A Recoura. The aluminium compound isolated proved to possess the formula $AlSO_4Cl,6H_2O$, analogous with the similar chromium previously described.—On a general method for the preparation of the metallic nitrides, by M. Guntz By heating various metallic chlorides with lithium nitride, several new nitrides have been obtained; among these are two new nitrides of iron having the composition Fe_3N_2 and FeN; chromic chloride gives CrN. By working with lithium hydride instead of the nitride, metallic hydrides are obtained, but in many cases the reaction is so violent that the hydrides formed are decomposed. The conditions necessary to prevent this decomposition are now being studied.—On barium ammonium and barium amide, by M. Mentrel. Barium ammonium is readily formed by the action of barium on ammonia at $-23°$ C., the dissociation pressures being measured for temperatures between $-63°$ and 28° C. Nitric oxide is absorbed by this substance at low temperatures, barium hyponitrite being formed; carbon monoxide is also absorbed under similar conditions, forming a new compound, barium carbonyl, $Ba(CO)_2$, a yellow, solid body which decomposes without explosion in contact with air, or on heating. Metallic barium, heated at 280° in a current of dry ammonia, gives barium amide.—On some products of the oxidation of aniline by atmospheric oxygen, by M. C. I. Istrati. By the prolonged action of air on boiling aniline, three new crystalline substances of high molecular weight and unknown constitution were obtained.—On a new albuminoid material extracted from maize, by MM. E. Donard and H. Labbé. The new substance, which is present in maize to the extent of about 4 per cent., and which is best extracted by boiling amyl alcohol, is given the name of maisine. It possesses properties which distinguish it from the albuminoid matters obtained from other cereals.—On the estimation of carbon monoxide and carbonic acid in vitiated air, by M. Ferdinand Jean. An application of the minimetric method to the examination of air, requiring no skilled manipulation in its use.—Researches on the budding of *Rhabdopleura Mormanni*, by MM. C. Vaney and A. Conté.—On the fibrillar continuity of the epithelial cells in the Nebalia, by M. Alphonse Labré.—On vital rhythm, by MM. Vaschide and Cl. Vurpas.

NEW SOUTH WALES.

Royal Society, September 3.—Prof. Warren, president, in the chair.—Languages of some native tribes of Queensland, New South Wales and Victoria, by Mr. R. H. Mathews. This paper dealt fully with the grammatical structure of the speech of the native tribes inhabiting the Murray River along the Victorian frontier, and stretching thence northerly through the central and western districts of New South Wales to the 29th parallel of latitude, and continuing onwards far into Queensland.—(1) Current papers, No. 7; (2) Meteorological notes, by Mr. H. C. Russell, C.M.G., F.R.S.—Meteoric dusts, New South Wales, by Prof Liversidge, F.R.S. The term meteoric dust is used because it is commonly applied to the materials forming the subject of this paper; it is not intended to state that the dusts are necessarily of cosmic or extra-terrestrial origin. The specimens described and exhibited were from Moruya (fell on December 15, 1880); from Uralla (fell on December 14, 1882); from near Broken Hill (fell 1896); from Menindie (fell on June 17, 1899); and Pambula (fell on October 5, 1899). Dust from the roof-beams, and mud from a covered cistern at the University and from the roof of the Observatory, Sydney, all three were collected in 1882. All the dusts are of a reddish colour except those from the University and Observatory, which are grey. The red dusts are mainly siliceous and argillaceous, and look as if they had come from dried-up water-holes; they contain a variety of organic and mineral matters such as might be expected from such a source, and in addition magnetite and metallic iron; the latter contains cobalt and nickel, which seems to indicate that the dusts contain some cosmic or extra-terrestria materials, part of which may have settled down and become mingled with the undoubted superficial terrestrial deposits, and part may have been derived directly from the atmosphere. The University and Observatory dusts also yielded magnetite and metallic iron containing cobalt and nickel, and the University dust yielded particles of gold; the Observatory dust has yet to be tested. The Moruya, Menindie and Barrier red dusts yielded particles of gold; the others have yet to be examined. Fuller information is given in the paper as to the constituents and chemical composition of the dusts, and analyses of volcanic and other dusts for comparison.—A rapid method of estimating lime, by Mr. F. B. Guthrie and Mr. C. R. Barker.

Linnean Society, August 27.—Mr. J. H. Maiden, president, in the chair.—On a new Cryptocarya from Lord Howe Island, by Mr. J. H. Maiden. The "black plum" of Lord Howe Island, the flowers of which have only recently been available, is shown to be new and described under the name *Cryptocarya Gregsoni*. It is also shown that an Elæocarpus occurs on the island, although the material at present available is insufficient to determine the species. Also that the Symplocos on the island, hitherto looked upon as *S. Stawelli*, is in reality new to science, and has been named *S. candelabrum* by Brand. Carl Mez, the monographer of the order Myrsinaceæ, has shown that there is no true Myrsine on the island, but that the genus Rapanea is represented by two species, *R. platystigma*, Mez (*Myrsine platystigma*, F.v.M.) and *R. myrtillina*, Mez, sp.n.—Life-histories of, and notes on, Australian Neuroptera, by Mr. W. W. Froggatt. One species of the family Panorpidæ (*Bittacus australis*, Klug) and twelve of the family Hemerobiidæ are treated of.—Some records of New South Wales mosses, by Mr. W. Forsyth. Eighty-one species or forms are noted. Of these, six forms are new, thirty-nine are additions to the known flora of the State, one is new for Australia, while the remainder are recorded from new or additional localities. The paper concludes with a list of thirty-three species collected in the neighbourhood of the Jenolan caves. — Census Muscorum Australiensium: a classified catalogue of the frondose mosses of Australia and Tasmania, collated from available publications and herbaria, by the Rev. Walter W. Watts and Thomas Whitelegge. Part i., comprising about 530 species.—The ulcer disease (black ophthalmia?) of rainbow trout, by Mr. R. Greig Smith. The ulcer disease of rainbow trout appears to be identical with the brook trout disease of American writers. The disease called black ophthalmia recently occurred at the same time as the ulcer disease in a tank of rainbow trout, but there is reason to believe that these two are not the same disease. From the ulcers, *Micrococcus pyogenes* was isolated. This produces somewhat similar lesions in mammals. The action of the micrococcus in trout appeared to be influenced by the unhealthy conditions to which the fishes had been subjected.

September 24.—Mr. J. H. Maiden, president, in the chair. — Australian fungi, new or unrecorded. Decades i.–ii., by Mr. D. McAlpine.—On a new species of Ardisia from New South Wales, by Mr. R. T. Baker.—Notes on Prosobranchiata. Part i. Lotorium, by Mr. H. Leighton Kesteven. The first portion of the paper is a discussion of the synonymy of the genus and family. The conclusions are in favour of the adoption of Montfort's name Lotorium for the genus, and Harris's Lotoriidæ for the family. The second part deals with the arrangement of the species of the genus.—The bacterial origin of the gums of the arabin group, by Mr. R. Greig Smith. (i) The soluble (arabin) wattle gums. A bacterium (*Bact. acaciae*, n. sp.) was found in pure culture in the tissues of *Acacia binervata* from which gum was exuding. In the laboratory it produced a gum which behaved to reagents, gave the same oxidation products and contained the same constituents, viz. arabinan and galactan, as the natural gum. This soluble gum, and probably all others of a similar nature, are therefore of bacterial origin, a circumstance which had been suggested by the irregular distribution of gum-bearing trees. (ii) The insoluble (metarabin) wattle gums. In company with *Bact. acaciae*, a bacterium (*Bact. metarabinum*, n. sp.) was separated from the bast of *Acacia penninervis* affected with gumming. In artificial culture it formed a gum which swelled with water like the metarabin gums. The gum gives the same reactions and contains the same arabinan-galactan complex as the natural gum. The metarabin is, therefore, the product of this organism.—Revision of the

Australian Curculionidæ belonging to the subfamily Cryptorhynchides, by Mr. Arthur M. Lea.—Descriptions of some new Araneidæ of New South Wales, No. 10, by Mr. W. J. Rainbow. Three new species, referable to the genera Storena, Araneus and Stephanopsis, are described and figured.—Notes on some New South Wales hepatics, by the Rev. W. Walter Watts. Twenty-three species are recorded, the majority of them collected on the Richmond and Brunswick rivers.

GÖTTINGEN.

Royal Society of Sciences.—The *Nachrichten* (physico-mathematical section), part v. for 1902, contains the following memoirs communicated to the Society :—

July 12 :—W. Voigt : Further contributions to the explanation of the properties of pleochroic crystals. H. Vöchting : On experimental anatomy (of plants).

July 26 :—F. Schmidt : The body-musculature of *Branchiobdella parasita*. W. Kaufmann : The electromagnetic mass of the electron. O. Wallach : Researches (xi.) from the University Chemical Laboratory of Göttingen—(1) on the isomerisation of cyclic hydrocarbons and ketones ; (2) on the transformation of cyclic ketones into bases of nitrogenous ring-systems. W. Voigt : New observations on magneto-optic phenomena in absorption bands.

DIARY OF SOCIETIES.

THURSDAY, NOVEMBER 13.

MATHEMATICAL SOCIETY, at 5.30.—Address on the Infinite and the Infinitesimal in Mathematical Analysis : Dr. E. W. Hobson.—Ueber den Satz der Gleichheit der Basiswinkel im gleichschenkligen Dreieck : Dr. D. Hilbert.—The Summation of a Certain Series : Prof. A. C. Dixon.—Expansion by Means of Lamé's Functions : Prof. A. C. Dixon.—Sets of Intervals : W. H. Young.—Note on Unclosed Sets of Points defined as the Limits of a Sequence of Closed Sets of Points : W. H. Young.—Wave Propagation in Two Dimensions : Prof. H. Lamb.—The Continuation of Certain Fundamental Powers Series : Prof. M. J. M. Hill.—A Geodesic on a Spheroid and an Associated Ellipse : L. Crawford.—The Propagation of Light in a Uniaxal Crystal : Prof. A. W. Conway.—A New Connection between Legendre Functions and Bessel Functions : E. T. Whittaker.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Presidential Address by Mr. James Swinburne.

FRIDAY, NOVEMBER 14.

ROYAL ASTRONOMICAL SOCIETY, at 5.—Another Form of Micrometer for Measuring Star Positions : H. C. Russell.—Ephemeris for Physical Observations of the Moon for 1903 : A. C. D. Crommelin.—Stereoscopic Pictures of Comet Perrine : Max Wolf.—On the Images Formed by a Parabolic Mirror, second paper—Influence on the Measurement and Reduction of a Photograph : H. C. Plummer.—Sur la Précision des Mesures Photographiques : M. Lœwy.—Herschel's Nebulous Regions compared with Photographs taken with the 20-inch Reflector and 5-inch Cooke Lens : Isaac Roberts.—*Possible papers :* On the Proper Motion of Bright Stars Relatively to Faint in the Zones near 30° North Declinations : H. H. Turner.—On a Standard Scale of "Seeing" : Percival Lowell.

PHYSICAL SOCIETY, at 5.—The Theory of the Aluminium Electrode : Dr. W. W. Tayler and J. K. H. Inglis.—A Determination of the Ratio of the Specific Heats at Constant Pressure and at Constant Volume for Air and Steam : W. Makower.

TUESDAY, NOVEMBER 18.

ROYAL STATISTICAL SOCIETY, at 5.30.—Annual Address by the President, Major P. G. Craigie, C.B.

INSTITUTION OF CIVIL ENGINEERS, at 8.—*Paper to be further discussed* : Electric Tramways : C. Hopkinson, B. Hopkinson and E. Talbot.

MINERALOGICAL SOCIETY, at 8.—On some Swiss Minerals : Prof. Lewis.—On Proustite : Mr. Lamplugh.—On Seligmannite and Baumhauerite : Mr. Solly.

ZOOLOGICAL SOCIETY, at 8.30.—On some Pliocene Mammalian Remains from Concud, near Teruel, Spain : Dr. A. Smith Woodward, F.R.S.—On the Birth of an Indian Elephant in the Society's Menagerie : F. E. Beddard, F.R.S.—Note on the Cabul Markhor : R. Lydekker, F.R.S.

WEDNESDAY, NOVEMBER 19.

CHEMICAL SOCIETY, at 5.30.—The Dynamic Isomerism of Thiourea and Ammonium Thiocyanate : J. E. Reynolds and E. A. Werner.—Isomeric partially Racemic Salts containing Quinquevalent Nitrogen ; (1) Part VIII. : Resolution of the Hydrindamine Bromocamphor Sulphonates ; (2) Isomeric Compounds of the Type $NR_1R_2H_2$: F. S. Kipping.—The Synthesis of αα-Dimethylglutaric Acid, of β-Hydroxy-αα-di-methylglutaric Acid, and of the Cis- and Trans- Modifications of αα-Dimethylglutaconic Acid : W. H. Perkin, jun., and Miss E. Smith.—A Reaction of some Phenolic Colouring Matters. Part II. : A. G. Perkin and C. R. Wilson.—The Vapour Pressures and Boiling Points of Mixed Liquids. Part II. : S. Young and Miss E. C. Fortey.—(1) The Vapour Pressures and Boiling Points of Mixed Liquids. Part III. ; (2) Note on Mixtures of Constant Boiling Point : S. Young.—Note on the Condensation Points of the Thorium and Radium Emanations : E. Rutherford and F. Soddy.—The Oxime of Mesoxamide and some Allied Compounds. Part II. Disubstituted Derivatives : Miss M. A. Whiteley.

ROYAL METEOROLOGICAL SOCIETY, at 7.30.—English Climatology, 1881–1900 : F. Campbell Bayard.—The Rainfall of Dominica : C. V. Bellamy.

GEOLOGICAL SOCIETY, at 8.—The Semna Cataract or Rapid of the Nile ; a Study in River-erosion : John Ball.—Geological Notes on the North-West Provinces (Himalayan) of India : Francis J. Stephens.—Tin and Tourmaline : Donald A. MacAlister.

ROYAL MICROSCOPICAL SOCIETY, at 8.—An Electrical Method of taking Microscope Measurements : Dr. Philip E. Shaw.—Demonstration on the Microscope in Fossil Botany : Dr. D. H. Scott, F.R.S.—Demonstration on an Apparatus for obtaining Monochromatic Light with the Mixed Jet : Dr. Edmund J. Spitta.

ENTOMOLOGICAL SOCIETY, at 8.

THURSDAY, NOVEMBER 20.

ROYAL SOCIETY, at 4.30.—*Probable papers* :—Report on the Recent Eruption of the Soufrière in St. Vincent and on a Visit to Mont Pelée in Martinique : Dr. Tempest Anderson and Dr. J. S. Flett.—Contributions to a Theory of the Capillary Electrometer. II. On an Improved Form of Instrument : G. J. Burch, F.R.S.—On the Correlation of the Mental and Physical Characters in Man. Part II. : Dr. Alice Lee, Miss M. A. Lewenz and Prof. K. Pearson, F.R.S.

LINNEAN SOCIETY, at 8.—Digestion in Plants : Prof. Sydney H. Vines, F.R.S.—Relation of Histogenesis to Tissue-Morphology : A. G. Tansley.—Stelar Structure of Schizæa and other Ferns : L. A. Boodle.

FRIDAY, NOVEMBER 21.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Adjourned Discussion upon Captain C. C. Longridge's Paper on Oil Motor Cars of 1902.—And, *time permitting*, Recent Practice in the Design, Construction and Operation of Raw Cane Sugar Factories in the Hawaiian Islands : J. N. S. Williams.

EPIDEMIOLOGICAL SOCIETY, at 8.30.—What is Climatic Disease : Lieut.-Col. A. M. Davies.

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