curriculum. A detailed table of the schools of Berlin is given in the report, and it shows a surprising variety of educational agencies in the German capital. The table reveals the fact that Berlin has 103 secondary schools and 306 elementary schools. It is evident from the table that the city is making great efforts to assist the industrial education of its youth. Another article in the report contains a statement of the number of students in higher institutions of learning in fifteen prominent countries. The tables show, first, that the Teutonic nations—Germany, Austria, Switzerland, Belgium and the Netherlands—are in the front rank, not only in the number of students in higher institutions, but also in the ratio of increase. Second, that the percentage of increase in students of technical institutions, such as polytechnic institutions, agricultural and mining schools, is everywhere larger during the year 1898–99 than in those of universities and colleges. We note, for instance, that the attendance in universities in Germany increased 6·5 per cent., but that of technical institutions increased 8·2 per cent. In Austria the increase in universities was 4 per cent. ; in technical institutions it was 7·8 per cent. In Russia the increase in universities was 1·2 per cent. ; in technical institutions it was 7·7 per cent. Such figures are significant, inasmuch as they indicate that the industries of Europe and America are claiming more thorough and more special preparation than formerly.

SCIENTIFIC SERIAL.

Transactions of the American Mathematical Society, vol. ii. No. 4, October.—Geometry of a simultaneous system of two linear homogeneous differential equations of the second order, by E. J. Wilczynski, is a continuation of a previous paper (in No. 1 of the present volume), entitled "Invariants of Systems of Linear Differential Equations." In this some new theorems are deduced, but it is mainly concerned with geometrical interpretations. The author confines himself to the special case of the equations

$$y'' + p_{11}y' + p_{12}z' + q_{11}y + q_{12}z = 0,$$
$$z'' + p_{21}y' + p_{22}z' + q_{21}y + q_{22}z = 0,$$

the independent variable being x. The consideration of configurations in hyperspace is avoided. The treatment is connected with the work of Halphen and Fano upon the single linear differential equation (*cf. Math. Annal.* vol. liii.).—The chief result of Dr. L. E. Dickson's theory of linear groups in an arbitrary field is the exhibition of four infinite systems of groups of transformations which are simple groups in every domain of rationality. For the case of the field of all complex numbers these groups are the simple continuous groups of Lie. The chief results in a finite field are given in the author's "Linear Groups" (Teubner, Leipzig, 1901). Corresponding to the isolated group of 14 parameters, there exists in the Galois field of order p^n a new system of simple groups of order p^{6n} $(p^{6n} - 1)(p^{2n} - 1)$.—On certain aggregates of determinant minors, by W. H. Metzler. In 1888 Dr. T. Muir showed (*Proc.* Roy. Soc. Edin., pp. 99–105) that a linear rotation exists between certain minors of a centro-symmetric determinant similar to Kronecker's relation between the minors of an axi-symmetric determinant ; and in 1900 he gave two theorems connecting the minors of any determinant, the first of which reduces to Kronecker's relation and the second of which reduces to his 1888 relation.—Prof. Metzler extends these relations and gives a series of types of linear relations between the minors of a centro-symmetric determinant. The present memoir gives the number of relations of each type.—Two papers by A. Pringsheim are (1) ueber die anwendung der Cauchy'schen multiplicationsregel auf bedingt convergente oder divergente reihen, and (2) ueber den Goursat'schen beweis des Cauchy'schen integralsatzes. These, as well as several of the other papers in the number before us, were communicated to the Ithaca meeting of the Society (August 19).—New proof of a theorem of Osgood's in the calculus of variations, by Oskar Bolza, is a simple one of the important characteristic property of a strong minimum in the calculus.—On certain pairs of transcendental functions whose roots separate each other, by the same author, proves the theorem, if, in a certain interval, p, q, ϕ_2, ϕ_1, ψ_2, ψ, are continuous real functions of the real variable x, and if the last four of these functions have continuous derivatives, then, y being a solution not identically zero of the differential equation $y'' + py' + qy = 0$, the roots of the functions $\phi_2 y' - \phi_1 y$, $\psi_2 y' - \psi_1 y$ will separate each other if no one of the three func-

tions $\phi_1 \psi_2 - \phi_2 \psi_1$, $\phi_1' \phi_2 - \phi_1 \phi_2' + \phi_1^2 + p\phi_2 \phi_1 + q\phi_2^2$, $\psi_1' \psi_2 - \psi_1 \psi_2' + \psi_1^2 + p\psi_2 \psi_1 + q\psi_2^2$ vanishes at any point of the interval in question. Certain extensions of the above theorem are also established.—On the system of a binary cubic and quadratic and the reduction of hyperelliptic integrals of genus two to elliptic integrals by a transformation of the fourth order, by J. H. Macdonald, effects the reduction by a special involution of order four containing a form which is the square of a quadratic. Reference is made to Prof. Bolza's inaugural dissertation (Göttingen, 1886). The sections discuss theorems on the biquadratic involution having a complete square, the system of a cubic and two linear forms and their conjugate system, the system of a cubic and quadratic and their conjugate system, certain involutions, and miscellaneous results on biquadratic involutions containing a complete square.—On the theory of improper definite integrals, by E. H. Moore. In the paper the author discusses the types connected with the names of Cauchy, Riemann, du Bois-Reymond, Dini, Schoenflies, Harnack and Jordan, Hölder, and de la Vallée-Poussin. Prof. Moore himself defines a system of types, which differ according to the way in which the integral depends (by definition) upon the sets of points of singularity of the integrand function with respect to definite integration.—On the convergence and character of the continued fraction $\dfrac{a_1 z}{1} + \dfrac{a_2 z}{1} + \dfrac{a_3 z}{1} + \dots$, by E. B. Van Vleck, is a portion of the paper, contributed by the author to the August meeting of the Society, on the convergence of the continued fraction of Gauss. In this portion the theorem established is—if, in such a fraction, the greatest modulus of any point of condensation of the sequence a_1, a_2, a_3, $\dots$ is k, then within a circle of radius $1/4k$, described about the origin as centre, the continued fraction will represent an analytic function, and the only singularities of the function contained within the circle will be poles. In any region excluding these poles and lying in the interior of the circle the convergence will be uniform.

SOCIETIES AND ACADEMIES.
LONDON.

Royal Society, November 21.—"The Pear-shaped Figure of Equilibrium of a Rotating Mass of Liquid." By Prof. G. H. Darwin, F.R.S.

"Sur la Stabilité de l'Équilibre des Figures Pyriformes affectées par une Masse Fluide en Rotation." By H. Poincaré, For. Mem. R.S.

"On the Process of Hair Turning White." By E. Metchnikoff, For. Mem. R.S.

Although the fact of hair turning white is a most familiar one, its mechanism has not as yet been unveiled. The authors of works on hair and dermatology acknowledge their ignorance concerning this subject.

Having undertaken a study on atrophic processes, and especially on senile atrophy, my attention has been called to the atrophy of hair pigment so frequent in old people.

Observations on grey hair, or on hair beginning to turn grey, showed me that the atrophy of its pigment is due to the intervention of phagocytes of the hair.

These cells have a single nucleus and their very different aspect one from another is due to numerous amœboid prolongations of their protoplasm. They are derived from the medullary part of the hair and make their way out into its cortical layer, where they absorb the pigment granules, which they then remove from the hair.

If we consider hair, one part of which is already white and the other still pigmented, we find a great many of these phagocytes. They are supplied with greatly developed prolongations and become insinuated between the keratic cells of the peripheral layer.

In absolutely white hair the phagocytes filled with pigment become more and more scarce, and most frequently completely disappear.

It is thus indubitable that the phagocytes of the hairs swallow up the granular pigment of the cortical layer and transfer it elsewhere, the result being the complete whitening of such hair. On observing the root of hair beginning to whiten, we often find a great many phagocytes filled with pigment.

The whitening of the hair of old dogs proceeds by the same mechanism. We equally find here a great number of phagocytes

supplied with numerous prolongations and stuffed with pigment granules.

The part played by phagocytes in the whitening of hair explains many phenomena observed long ago, but not as yet sufficiently understood. Thus, hair turning white in a single night, or in a few days, may be explained by the increased activity of hair phagocytes thus enabled to transfer the pigment in so short a time.

The mechanism of the whitening of hair through the agency of phagocytes allows this case of atrophy to be classed under the general laws of atrophy of solid parts of the organism.

"On the Inheritance of the Mental Characters in Man." By Karl Pearson, F.R.S.

(1) Mr. Francis Galton, in his "Natural Inheritance," first, I believe, endeavoured to give a *quantitative* appreciation of the inheritance of the mental characters in man. Mr. Galton's data were not very copious, and in default of a method of dealing quantitatively with characters not capable of exact scaling, it was not possible to deduce absolutely conclusive results. On November 19, 1899, a paper was read to the Royal Society showing how the inheritance of characters not capable of exact quantitative measurement might be deduced. I purpose in this notice to give only a few results from some very elaborate observations which have been made in the course of the last few years and reduced by the processes of that paper.

(2) The material was collected in two separate ways. In the first series—the Family Measurement Series—only physical characters were observed. This series was started six years ago, and upwards of 1100 families, father, mother, and not more than two sons and two daughters, were measured. The series was closed two years ago, and last year Dr. Alice Lee completed the reduction of this very large mass of material.

My second series is still more extensive; but it relates only to collateral—fraternal—heredity. It aims at observing a wide range of both physical and mental characters in pairs of school children. I have received most kindly aid from a great number of masters and mistresses in public schools, high schools, secondary and primary schools of all classes. This will be very fully acknowledged in the final publication of the results. But although the work has been in progress for three years, we have still only material enough to draw conclusions in the case of pairs of brothers, of whom more than 1000 cases have been observed.

(3) Only three of the physical measurements of this extensive series have yet been reduced, and the sister-sister and sister-brother observations will have to be carried on for another year or two before they are sufficiently numerous to be dealt with. The whole material will then require two or three years for tabulation and calculation. But as the problem of the inheritance of the mental characters and their correlation with the physical was occupying our attention in another field, the indefatigable Dr. Lee undertook the tabulation and calculation of the coefficients of heredity in the case of seven mental and three physical characters for pairs of brothers. The number of pairs dealt with in each case was 800 to 1000. The method adopted was that of the memoir on "The Inheritance of Characters not capable of Exact Quantitative Measurement."[1] Thus, under the heading *Conscientiousness* were two divisions, Keen and Dull, and the teacher might place a cross on either of these or on the dividing line. Similar divisions occurred in the other categories, except that *Intelligence* was given six and *Temper* three subdivisions, &c. The sole object in the present preliminary notice is to draw attention to the following results :—

Coefficients of Collateral Heredity.
Correlation of Pairs of Brothers.

Physical Characters. (Family Measurements.)		Mental Characters. (School Observations.)	
Stature	0·5107	Intelligence	0·4559
Forearm	0·4912	Vivacity	0·4702
Span	0·5494	Conscientiousness	0·5929
Eye-colour	0·5169	Popularity	0·5044
(School Observations.)		Temper	0·5068
Cephalic index	0·4861	Self-consciousness	0·5915
Hair-colour	0·5452	Shyness	0·5281
Health	0·5203		
Mean	0·5171	Mean	0·5214

The physical characters were measured or observed on two entirely different groups of individuals—in the one case adults, in

[1] *Phil. Trans.* A vol. cxcv. pp. 79–150.

the other children were examined. The means for both series are almost identical ('5170 and '5172) Dealing with the means for physical and mental characters their likeness forces us to the perfectly definite conclusion : *That the mental characters in man are inherited in precisely the same manner as the physical.* Our mental and moral nature is, quite as much as our physical nature, the outcome of hereditary factors.

Entomological Society, November 6.—The Rev. Canon Fowler, president, in the chair.—The Rev. F. D. Morice exhibited two imperfectly developed females of *Osmia leucomelana* found dead in a *rubus* stem at Woking with their cases.—Mr. C. P. Pickett exhibited a series of aberrations of *Colias hyale* taken at Folkestone during August 1900–1.—Mr. F. B. Jennings exhibited a specimen of *Trachyphloeus myrmecophilus*, Seidl., taken at Hastings in September last, retaining intact the deciduous "false mandibles," with the aid of which the imago of the species of this and certain other genera of weevils is said to work its way to the surface after emerging from the pupa underground. These mandibles are usually shed as soon as the imago begins its life above ground, as there is no further use for them.—Mr. W. J. Kaye exhibited a collection of butterflies made by him in Trinidad, with several hitherto undescribed species. He said that the probable total rhopalocerous fauna was about 250 species, the island—about the size of Somersetshire—being thus remarkably rich in butterflies. The number of the species in the families exhibited were Nymphalidæ 34, Satyridæ 13, Papilionidæ 6, Pieridæ 31, Erycinidæ 29, Lycænidæ 27, Hesperiidæ 62—nearly all taken within three or four miles of Port of Spain. The series of *Heliconius telchinia* and *Tithorea megara*, var. *flavescens*, were particularly fine, showing the yellow coloration only found in Trinidad and the coast of Venezuela immediately opposite. A long series of *Papilio xeuxis*, and *Papilio alyattus*, many of them bred from the same parent ♀, show that these two are in reality identical species. The number of Erycinidæ in Trinidad compared with the poverty of the same species in other West Indian islands indicates the different origin of its fauna, and suggests affinity with the mainland of Venezuela, which at the nearest point is but seven miles distant.—Dr. Chapman exhibited specimens of *Parnassius apollo* taken last July in Castile and Aragon (Spain), as well as a number of specimens of both *P. apollo* and *P. delius*, chiefly Swiss and French, taken by himself, Mr. Tutt, Mr. A. H. Jones (at Digne), and Mr. Rowland-Brown (at Susa, N. Italy), for comparison with the Spanish specimens and to illustrate the extent to which the races of these species approach each other in western Europe.—Mr. G. C. Bignell sent for discussion a specimen of *Sphecophaga vesparum*, Curt., and the cocoon from which it had been bred.—Mr. Gilbert J. Arrow communicated a paper upon the genus *Hyliota*, with descriptions of new forms and a list of described species, and Mr. W. L. Distant, contributions to a knowledge of the Rhynchota.

Royal Meteorological Society, November 20.—Mr. W. H. Dines, president, in the chair.—A paper by Mr. A. Lawrence Rotch on the exploration of the atmosphere at sea by means of kites was read by the secretary. The author has for some years past devoted his attention to the use of kites to obtain meteorological observations at the Blue Hill Observatory, Mass., U.S.A., and he has successfully carried on the work of exploring the air there to a height of three miles by several hundred kite flights executed in varied weather conditions whenever the velocity of the wind exceeded twelve miles an hour. Certain types of weather, however, such as anti-cyclones, accompanied by light winds, can rarely be studied. Mr. Rotch now proposes the employment of kites carrying meteorographs on steamships, especially on vessels cruising in tropical oceans. He has himself demonstrated the practicability of this scheme, as on August 22 last he raised a kite to an elevation of half a mile from a tow-boat in Massachusetts Bay, when the velocity of the wind at sea-level varied between six and ten miles an hour. At the end of the same month, when crossing the North Atlantic from Boston to Liverpool on the steamship *Commonwealth*, he was able to raise kites carrying a meteorograph to an altitude of 1600 feet on five days out of the eight. The chief feature of these records was the rapid change of temperature with height.—A paper by Prof. J. Milne, F.R.S., on meteorological phenomena in relation to changes in the vertical, was also read by the secretary. When resident in Japan some years ago the author carried on numerous observations by seismographs for ascertaining changes in the vertical, and found that

the more important displacements of the horizontal pendulums are of three types, viz. intermediate, long and short period wanderings. During the last five years Prof. Milne has had continuous photographic records of a horizontal pendulum at his residence at Shide, Isle of Wight, and he now makes a comparison of these records with the weather conditions prevailing during the first six months of 1901. He says that assuming that a locality can be chosen where the diurnal wave and effects due to rain and desiccation are small, which his observations indicate as possible, records of what appear to be the effects due to barometrical gradients may be obtained. When these are large and appear suddenly, the movements of the pendulum may be marked. At Shide the westerly displacement of a pendulum has, for several years past, been regarded as indicating the approach of bad weather.

Anthropological Institute, November 12.—Mr. W. Gowland, vice-president, in the chair.—Mr. R. Shelford exhibited (1) a series of slides of natives of Sarawak, and (2) a collection of gold jewellery found in Borneo, lent by H.H. the Rajah of Sarawak.—Mr. Shelford read a paper entitled " A Provisional Classification of the Swords of the Natives of Sarawak."—Mr. J. Gray exhibited a craniometer for measuring the height of the head.

November 26.—Mr. C. H. Read, ex-president, in the chair.—Mr. E. Willet exhibited a number of Palæolithic implements from Savernake.—Mr. N. W. Thomas exhibited a collection of " totem-stones " collected by the Hon. Auberon Herbert. The exhibit was discussed by Mr. Balfour and Mr. Read.—Mr. R. J. Gatty read a paper on dwarf flints from the sand mounds of Sennthorpe, illustrated by a number of specimens.

MANCHESTER.

Literary and Philosophical Society, November 26.—Mr. Charles Bailey, president, in the chair.—Prof. H. B. Dixon mentioned that Mr. H. Brereton Baker had succeeded in making a mixture of hydrogen and oxygen so pure that it would not explode when the vessel containing it was raised to a red heat or when a silver wire was melted in it. In one case some water was gradually formed, so that the explosion of the gases would seem to depend on the presence of some impurity other than steam itself.—Prof. F. E. Weiss exhibited two dwarf Japanese trees which have been purchased for the Manchester Museum. They were *Pinus parvifolia* and *Thuja obtusa* (the Japanese cypress), both natives of Northern Japan, where they grow at very great altitudes and are naturally of small growth. The trees exhibited, which were thirty and forty years old respectively, were only six to nine inches in height, these dwarf forms being obtained by a system of starving and pruning back the plants and by contortions of the stem and branches which retard the nutritive processes.—Mr. J. E. Petavel read a paper entitled " On the Measurement of High Explosive Pressures." After a short review of the various methods and instruments used by Rumford, Bunsen and Rodman in the first half of the nineteenth century, and by Noble, Berthelot, Vieille, Le Chatelier and Mallard in recent years, the author went on to describe a new form of recording gauge, which is, in principle, not far removed from the ordinary crusher gauge. The short copper cylinder is replaced by a hollow steel cylinder one inch in diameter and five inches long, the relative cross-sectional areas of the piston and cylinder being calculated so that the strains are well below the elastic limit of the material. The actual motion of the piston is thus limited to one or two thousandths of an inch, and a very high time period is obtained. The motion of the piston is transmitted to a mirror, the movement of which is photographically recorded on a revolving drum. The amplitude of the records thus obtained is about $1''$; they can be measured to an accuracy of about one-thousandth of an inch. A number of records referring to mixtures of coal gas and air or oxygen and hydrogen were shown, the pressures ranging up to twelve thousand pounds per square inch.

PARIS.

Academy of Sciences, November 25.—M. Fouqué in the chair.—On the absence of action of a magnetic field upon a mass of air which is the seat of a current of displacement, by M. R. Blondlot. It has been shown in a previous paper that if a mass of air is moved in a magnetic field normally to the lines of force no electric displacement results in this mass of air. From this it follows that a mass of air which is the seat of an electric displacement should undergo no action in a magnetic field. If

the principle of action and reaction is applied to this proposition it leads to the conclusion that a current of displacement in the air exerts no magnetic action, and consequently that the charging current of a condenser is an open current from the magnetic point of view. This is in direct opposition to one of the fundamental principles of Maxwell's theory, and choice has to be made between renouncing this theory or the principle of action and reaction.—On ibogine, the active principle of a plant of the genus Tabernæmontana, coming from the Congo, by MM. A. Haller and Ed. Heckel. In the Congo and neighbouring countries several species of plants possessing analeptic and stimulating properties are used by the natives under the name of Iboga. These peculiar properties have been assigned by MM. Dybowski and Landrin to a special glucoside, by M. Schlagdenhaufen to a new alkaloid. The specimens of this plant shown in the Colonial Exhibition of 1900 have been utilised for the extraction of this substance. The amount of material was small, but it is clear that the substance is a true alkaloid and not a glucoside, and the formula $C_{26}H_{32}N_2O_2$ provisionally assigned to it. The alkaloid itself has been obtained in the form of white crystals, but all the salts obtained up to the present are amorphous.—The mummified birds of ancient Egypt, by MM. Lortet and Gaillard. The specimens examined differ greatly in their states of preservation, some being so perfectly preserved that a simple examination of the feathers was sufficient for the identification whilst in others the skeleton was the only possible guide. Some thirty-eight species were identified, the greater number of these not having been found before in the mummy state.—The *Okapia Johnstoni*, a new mammal allied to the giraffe discovered in Central Africa, by Prof. E. Ray Lankester. A drawing and description of a new mammal discovered by Sir H. Johnstone in the Semliki Forest on the borders of the Congo Free State and Uganda. The skin bears no resemblance to that of the giraffe, but its relationship to this animal is absolutely demonstrated by its skull. It may possibly be the living representative of the Miocene genus Helladotherium.—Remarks by M. Albert Gaudry on the preceding paper. M. Gaudry presented at the same time a restored head of Helladotherium.—M. Yves Delage was elected a member in the section of anatomy and zoology in the place of the late M. de Lacaze-Duthiers; M. Gouy, a member in the section of physics in the place of the late M. Raoult.—On the number of roots common to several equations, by M. A. Davidoglou.—The determination of some coefficients of self-induction, by Mr. G. A. Hemsalech. In a previous paper on the spectra of electric sparks the coefficients of self-induction were calculated from the dimensions of the coils. It has now been recognised that these were too great, and hence they have been redetermined experimentally. The most advantageous values for spark-spectrum observations are now given as ·00286 Henry for cobalt, zinc, magnesium and aluminium ; ·00689 Henry for manganese and silver ; ·0254 Henry for antimony ; and ·0419 Henry for iron, nickel, cadmium, tin, lead, bismuth and copper. —On the regular distribution of the magnetic inclination and declination in France up to January 1, 1896, by M. E. Mathias. —On the application of the clear chamber of Govi to the construction of a comparator for end standards, by M. A. Lafay. The arrangement described allows the difference in length between a standard and its copy to be expressed as the algebraic sum of the displacements of two plane mirrors mounted on micrometer screws. It has the advantage over the ordinary methods in avoiding all deformations due to the actual contacts of the ends of the standards with the holders used in the ordinary instruments.—On the combinations of aluminium chloride with the alkaline chlorides, by M. E. Baud. It is shown by thermochemical studies that the compounds $Al_2Cl_6.3NaCl$ and $Al_2Cl_6.3KCl$ exist, and very probably also $Al_2Cl_6.6NaCl$ and $Al_2Cl_6.6KCl$.—On the preparation of barium, by M. Guntz (see p. 112).—On a new volatile salt of beryllium, by MM. G. Urbain and H. Lacombe. A description of the preparation and properties of a basic acetate of beryllium. It boils under the ordinary pressure without any sign of decomposition at a temperature of 330–331° C., and its vapour density at the temperature of boiling mercury was found to be 13°·9, which is in accordance with the atomic weight Be = 9.—The action of fuming sulphuric acid upon acetaldehyde and propaldehyde and acetone, by M. Marcel Delépine.—On the electrolytic preparation of the halogen derivatives of acetone, by M. A. Richard. The electrolysis of mixtures of acetone with hydrochloric and hydrobromic acids gives monochloroacetone and monobromo-

acetone respectively. In the present paper the conditions necessary for a maximum yield of the halogen derivative are determined.—On the transformation by a new reaction of two xanthydrols into xanthenes, by M. R. Fosse.—The etherification of phosphorous acid by glycerol and glycol, by M. P. Carré. —On the reserve store of carbohydrates in the seed of *Aucuba japonica*, by M. G. Champenois. The seed of this plant contains a large ·quantity of cane-sugar accompanied by a glucoside. Besides the soluble compounds the seed contains as constituents of its hard albumen a galactane, a mannane and a pentane which give on hydrolysis galactose, mannose and a pentose which appears to be arabinose.—On an experiment of M. Berthelot relating to the transformation of glycerol into sugar by the testicular tissue, by M. Gabriel Bertrand. It is found that the action of the sorbose bacterium upon glycerol, which up to the present has been regarded as specific, is really an action common to different organisms.—Experiments on chlorophyll assimilation, by M. M. Harroy. The author has repeated the experiments of M. Friedel, but has not been able to confirm them, and he regards it as premature to state as a fact that the chlorophyllian synthesis may take place outside the vegetable organism and without the intervention of living matter.—Researches on the law of action of sucrase, by M. Victor Henri. The speed of inversion of saccharose by any acid is at any instant proportional to the quantity of saccharose present in the solution, from which is derived the well-known formula giving the relation between the time and the quantity present $k = 1/t \log a/a - x$. It is found that the inversion of sugar by sucrase takes place more rapidly than corresponds to this law, and a new formula is derived which expresses the experimental results better : $2k_1 = 1/t \log a + x/a - x$.—The cell of Sertoli and the formation of spermatozoids in the sparrow, by M. Gustave Loisel.—Some new geological observations in the Belledonne chain, by M. Pierre Termier.—A graphical method permitting the study of the circumstances of the course of a steerable aërostat, by the examination of the projection of its trajectory upon the earth, by M. J. Armengaud, jun.—The increase of the number of red corpuscles in the blood during a balloon ascent, by M. J. Gaule. It is shown that there is a true formation of red globules on arriving suddenly at a high altitude, the phenomena taking place with great rapidity.—The scientific treatment of deafness, by M. Marage.

DIARY OF SOCIETIES.

THURSDAY, December 5.

ROYAL SOCIETY, at 4.30.—On the Spontaneous Ionisation of Gases : C. T. R. Wilson, F.R.S.—In title only : Notes on Quantitative Spectra of Beryllium : Prof. W. N. Hartley, F.R.S.—Notes on the Development of *Paludina vivipara*, with Special Reference to the Urinogenital Organs and Theories of Gasteropod Torsion. (Preliminary Note) : Miss I. M. Drummond.—In title only : Preliminary Account of the Prothallium of *Phylloglossum* : Prof. A. P. W. Thomas.

SOCIETY OF ARTS, at 4.30.—The New Trade Route to Persia by Nushk and Seistan : Edward Penton.

LINNEAN SOCIETY, at 8.—On the Foraminifera collected round the Funafuti Atoll from Shallow and Moderately Deep Water, with Notes on New Species from the Sands of the Reef Slope : F. Chapman.—Protoplasmic Connections in the Lichens : Dr. J. H. Salter.—Exhibition : Ten Abnormal Sacra of the Frog : Dr. A. G. Ridewood.

CHEMICAL SOCIETY, at 8.—Influence of Substitution on the Formation of Diazoamines and Amino-azo-compounds : G. T. Morgan.—The Determination of Available Plant Food in Soils by the Use of Dilute Solvents : A. D. Hall and F. J. Plymen.—Some New Derivatives of Gallic Acid : F. B. Power and F. Shedden.

RÖNTGEN SOCIETY, at 8.30.—Bullets and their Billets : Experiences with X-Rays in South Africa : J. Hall Edwards.

FRIDAY, December 6.

GEOLOGISTS' ASSOCIATION, at 8.—Notes on a Recent Visit to Egypt : Dr. C. W. Andrews.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Gas-Engine Construction R. W. A. Brewer.

MONDAY, December 9.

SOCIETY OF ARTS, at 8.—The Chemistry of Confectioners Materials and Processes : William Jago.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.

IMPERIAL INSTITUTE, at 8.30.—The Maroons of Jamaica : H. T. Thomas.

VICTORIA INSTITUTE, at 4.30.—The Preparation of the Earth for Man's Abode : Prof. J. Logan Lobley.

TUESDAY, December 10.

INSTITUTION OF CIVIL ENGINEERS, at 8.—*Paper to be further discussed* : Train-Resistance : John A. F. Aspinall.—*Paper to be read* : Motive-Power from Blast-Furnace Gases : Bryan Donkin.

WEDNESDAY, December 11.

SOCIETY OF ARTS, at 8.—Aluminium : Prof. Ernest Wilson.

THURSDAY, December 12.

ROYAL SOCIETY, at 4.30.

MATHEMATICAL SOCIETY, at 5.30.—Flexure of a Circular Plate : J. H. Michell.—Non-uniform Convergence, and the Integration of Series : Dr. Hobson, F.R.S.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Physical Properties of certain Aluminium Alloys and some Notes on Aluminium Conductors : Prof. E. Wilson (conclusion of discussion).—Some Principles underlying the Profitable Sale of Electricity : Arthur Wright.

CHEMICAL SOCIETY, at 8.—Extraordinary General Meeting.

FRIDAY December 13.

PHYSICAL SOCIETY, at 5.—On Circular Filaments and Circular Magnetic Shells equivalent to Circular Coils, and on the Equivalent Radius of a Coil : Prof. Thomas R. Lyle.—Air Pressures used in playing Brass Instruments : Dr. Barton and S. C. Laws.—A New Hygrometric Method : E. B. H. Wade.

ROYAL ASTRONOMICAL SOCIETY, at 5.

MALACOLOGICAL SOCIETY, at 8.

EPIDEMIOLOGICAL SOCIETY, at 8.30.—Dysentery in Asylums : Dr. Mott, F.R.S.

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