

his brother had had in Germany, and the fee was 47*l.* 13*s.* 9*d.* for a year. The explanation is given by the secretary of the London college, who pointed out in a letter to Mr. Holzappel that "the continental colleges are endowed by the State, but in England they have to live on the fees of students for the most part, with a very small grant from the State in some cases and what they can raise voluntarily from the public." But it is evident that while the highest form of instruction in science can be obtained at so small a cost, there will never be a lack of properly trained men to look after the manufactures of Germany.

FULL particulars have now been published of the first annual conference of persons in the north of England concerned in primary, secondary, technical and other forms of higher education, which was announced in our issue for July 17. The conference will be divided into four sessions—two meetings on each of the days January 2 and 3, 1903—presided over respectively by Mr. M. E. Sadler, director of special inquiries to the Board of Education; Prof. H. E. Armstrong, F.R.S., Prof. Smithells, F.R.S., and Prof. L. C. Miall, F.R.S. There will be a reception by the Lord Mayor of Manchester of members of the conference on January 2, in the Municipal School of Technology, Manchester, where the meetings will be held, after which various papers will be read. Miss S. A. Burstall, head mistress of the Manchester High School for Girls, will take up the subject of the curriculum in different types of schools. Dr. Kimmins, at the afternoon meeting of the first day, deals with the coordination and delimitation of science teaching in various grades of schools. The methods of teaching experimental science in its early stages will be discussed on the morning of January 3, Mr. W. French, principal of the Storey Institute, Lancaster, taking up physics, and Mr. R. L. Taylor, of the Central School, Manchester, considering chemistry. At the last meeting, Mr. H. W. T. Wager will introduce the subject of methods of nature-study. Great care has been taken to encourage discussion at each meeting; the names of well known teachers are included in the programme as having promised to contribute to the debates. In connection with the conference, there will be an exhibition of apparatus, preparations and diagrams, such as teachers themselves have prepared or which pupils have made, to illustrate methods of nature-study and the teaching of experimental science. A class-room, fitted up as a model of what it is desired should be provided for the teaching of physics and chemistry in their early stages, will form part of the exhibition. The admission to the conference will be free, by ticket, to be obtained from the honorary secretaries, Dr. H. Lloyd Snape, Director of Education to the Lancashire County Council, and Mr. J. H. Reynolds, Director of Technical Instruction for the city of Manchester and principal of the Manchester Municipal Technical School, which is the office of the conference.

SCIENTIFIC SERIALS.

Transactions of the American Mathematical Society, vol. iii. No. 4 (October).—G. A. Miller, on the groups of order p^m which contain operators of order p^{m-2} . It appears that if $p > 2$ and $m > 5$, there are two and only two such groups not containing either an invariant cyclic subgroup of order p^{m-2} or else an abelian subgroup of type $(m-2, 1)$. These two groups are conformal respectively with the abelian groups of type $(m-2, 2)$ and of type $(m-2, 1, 1)$.—C. A. Scott, (1) on the circuits of plane curves; (2) on the real inflexions of plane curves.—J. Hadamard, on the theory of plane elastic plates.—E. J. Wilczynski, covariants of systems of differential equations, and applications to the theory of ruled surfaces. The system considered is $y'' + p_{11}y' + p_{12}z' + q_{11}y + q_{12}z = 0$ and another similar equation with z'' for y' . All covariants can be expressed in terms of three, together with invariants.—A. S. Gale, on the rank, order and class of algebraic minimum curves.—H. F. Blichfeldt, on the determination of the distance between two points in space of m dimensions. Without assuming the continuity and independence of the coordinates, but assuming that distance-relations exist, a series of axioms is laid down and possible forms deduced for the analytical expression for the distance between two points.—H. Maschke, on superosculating quadric surfaces.—E. H. Moore, a definition of abstract groups.—A. Emch, algebraic transformations of a complex variable realised by linkages.

NO. 1727, VOL. 67]

American Journal of Mathematics, vol. xxiv. No. 4 (October).—M. Bôcher, on systems of linear differential equations of the first order. This contains proofs of some existence-theorems by a method of successive approximation.—T. M. Putnam, on the quaternary linear homogeneous group and the ternary linear fractional group. The determinant being unity, and the group being symbolised by substitutions, the canonical forms of the generators fall into eleven principal types, with various subdivisions. The periods of the substitutions are considered, and different commutative subgroups investigated.—A. N. Whitehead, on cardinal numbers. The results of this paper are all expressed in Peano's symbolism, on which there is an introductory section.—G. A. Miller, on a method of constructing all the groups of order p^m (p being any prime).—H. F. Stecker, non-Euclidean properties of plane cubics and of their first and second polars. This is a continuation of a former paper in vol. xxii. of the same journal.

Annals of Mathematics (2) vol. iv. No. 1. (October).—G. A. Bliss, on the geodesic lines on the anchor-ring. The author obtains explicit formulæ, involving elliptic functions, which define a doubly infinite family of geodesics. He also shows that, according to Mangoldt's classification, the points on the inner equator are of the first kind and all others of the second kind. Good illustrative diagrams are given.—H. F. Blichfeldt, proof of a theorem concerning isosceles triangles.—L. E. Dickson, an elementary exposition of Frobenius's theory of group-characters and group-determinants.—E. V. Huntington, on Mr. Ransom's mechanical construction of conics.

SOCIETIES AND ACADEMIES.

LONDON.

Chemical Society, November 19.—Dr. J. Emerson Reynolds V. P. R. S., president, in the chair.—The "dynamic isomerism" of thiourea and ammonium thiocyanate. When the ammonium salt is heated, there is formed a definite compound of this with 25 per cent. of thiourea formed from it; further, melting-point curves of mixtures of these two substances show that other molecular combinations occur.—Isomeric partially racemic salts containing quinquivalent nitrogen; part 8, resolution of the hydrindamine camphor sulphonates, by Dr. F. S. Kipping. The author has confirmed the theory proposed by him in 1899 to account for the existence of these salts by the resolution of the partially racemic salt into four isomerides.—The oxime of mesoxamide and some allied compounds, by M. A. Whiteley. A description of the disubstituted derivatives of mesoxamide, all of which possess the characteristic properties of furnishing yellow alkali salts and purple ferrous compounds.—Interaction of ketones and aldehydes with acid chlorides, by F. H. Lees. When methyl *n*-nonylketone is acted upon by benzoyl chloride, there is formed β -benzoxyundecylene; this reaction has been extended to other ketones, and a series of benzoxyolefines so produced.—The synthesis of $\alpha\alpha$ -dimethylglutaric acid, hydroxy- $\alpha\alpha$ -dimethylglutaric acid, and of the *cis*- and *trans*-modifications of $\alpha\alpha$ -dimethylglutaconic acid, by Dr. W. H. Perkin and A. E. Smith.—A reaction of some phenolic colouring matters, by A. G. Perkin and C. R. Wilson. Potassium derivatives of a number of naturally occurring colouring matters have been prepared by interaction with potassium acetate.—Note on mixtures of constant boiling point, by Dr. S. Young. The composition of the mixture of carbon tetrachloride and methyl alcohol having the minimum boiling point is shown to contain 80 per cent. of the former.—The vapour pressures and boiling points of mixed liquids, part 2, by Dr. S. Young and E. C. Fortey. Part 3, by Dr. S. Young. An investigation of the formula proposed by the authors expressing the relation between the vapour pressure of the mixture and those of its constituents. Note on the condensation points of the thorium and radium emanations, by E. Rutherford and F. Soddy. When the emanations from thorium and radium compounds are passed through a copper spiral immersed in liquid air, they are condensed and retained in the copper tube and are volatilised when the temperature is raised to -125° in the case of thorium emanation and to -130° in the case of radium.—Note on the action of barium hydroxide on dimethylviolic acid, by M. A. Whiteley. The principal product of this action is isonitrosomalondimethylamide.—The determination of strychnine and brucine in nuxvomica, by E. Dowzard. The brucine is determined by colorimetric estimation of the tint produced by the solution of the alkaloidal residue in nitric acid.

Entomological Society, November 5.—The Rev. Canon Fowler, president, in the chair.—Mr. H. J. Elwes, F.R.S., exhibited, on behalf of Mrs. Mary de la Bêche Nicholl, a collection of butterflies made by her in February, March and April in Southern Algeria; also a collection of butterflies afterwards made by her in the Picos de Europa in Spain; the latter collection comprised about 85 species and was made in 25 days. Mr. Elwes remarked that these collections contained several interesting species of *Erebia*, *Lycæna* and other genera, and included three species from Algeria not at present represented in the British Museum collection.—Dr. Chapman exhibited, and made remarks on, two butterflies taken last July at Bejar, in West Central Spain, both notable as being very decidedly larger than any forms of the same species recorded from any other locality. He stated that one of them belonged to a form of *Lycæna argus* (the *L. aegon* of the British list). They were taken about one-and-a-half miles east or south-east of Bejar on July 9 and following days.—Mr. R. South exhibited four specimens of a large form of *Cupido minima* (*Lycæna minima*) from Cumberland, sent to the Natural History Museum by Mr. Mousley, of Buxton. He also exhibited, on behalf of Mr. J. H. Fowler, of Ringwood, a series of *Lithosia deplanata*, Esp., from the New Forest, showing interesting variations in both sexes, but especially in the females. It was stated that Mr. Eustace Bankes had recently recorded somewhat similar aberrations of the species from the Isle of Purbeck.—Mr. Hamilton Druce exhibited a specimen of *Limenitis populi*, L., caught whilst being chased by a small bird in July, 1901, near Riga, Russia; also a specimen of *Sesamia nonagrioides*, Lefeb., bred from a larva found feeding in the interior of a banana.—Mr. J. H. Carpenter exhibited a gynandromorphous specimen of *Lycæna icarus*, having the coloration of the male on the left side and that of the female on the right side, captured on Ranmore Common, Surrey, in June last; also several aberrations of this species from Ranmore Common and the Isle of Wight. He also showed specimens of *Vanessa antiopa*, bred from German larvæ, including a remarkable aberration in which the usual blue spots on the upper wings were entirely absent.—Mr. H. St. J. Donisthorpe exhibited a foreign specimen of *Quedius saturalis*, lent him by Mr. Keys, of Plymouth, and a British specimen taken by himself at Gravesend in 1891; also for comparison a specimen of *Quedius obliteratus* taken at Plymouth. He said that most of the specimens of, so-called, *Quedius saturalis* in British collections were really *Q. obliteratus*.—Mr. Pickett exhibited a remarkable series of *Angerona prunaria*, the result of four years' inter-breeding between dark males from Raindean Wood, near Folkestone, and light-coloured females from Epping Forest; also unicolorous light orange-yellow males, light yellow females, dark orange males sprinkled with black, and other unusual aberrations.—Prof. E. B. Poulton, F.R.S., exhibited a series of lantern slides prepared from negatives taken by his assistant, Mr. A. H. Hamm, of the Hope Department, and Mr. Alfred Robinson, of the Oxford University Museum. The slides represented a series of the larvæ and imagines of British moths photographed under natural conditions.—Prof. Poulton also showed a representation of the pupa of *Limenitis populi* prepared from Portschinski's figure and description, and explained the highly ingenious hypothesis by which the appearances are accounted for by the Russian naturalist.—Mr. C. O. Waterhouse communicated a paper by Mr. L. R. Crawshaw entitled "On the Life-History of *Drilus flavescens*, Rossi."

Zoological Society, November 18.—Prof. G. B. Howes, F.R.S., vice-president, in the chair.—Dr. Henry Woodward, F.R.S., exhibited two photographs of the heads of stags of the red deer (*Cervus elaphus*) bred in New Zealand, lent to him for exhibition by Mr. Lewis Karslake. Dr. Woodward read an extract from a letter from Mr. D. Russell, hon. sec. to the Otago Acclimatisation Society, giving an account of the successful naturalisation of the red deer in New Zealand. Two stags and six hinds had been turned out in 1868, and their offspring now numbered between 4000 and 5000 individuals. The carcasses of some of these deer weighed from 500 to 600lb.—Mr. J. L. Bonhote exhibited some hybrid ducks which he had bred during the past summer, and pointed out in what manner the crosses partook of their parent forms. Three of the specimens exhibited were crosses between three species, viz. the Indian spot-billed duck, the wild duck and the pintail, both the parents being themselves hybrids, thus proving, with regard to the species enumerated, that the hybrids were perfectly

fertile *inter se*.—Mr. Oldfield Thomas, F.R.S., exhibited and made remarks upon a stuffed male and the skull of a female of the East-African representative of the Bongo antelope, recently described by him as *Bocercus euryceros isaaci*, which had been obtained by Mr. F. W. Isaac in the Mau Forest and presented by him to the national collection.—Mr. Thomas also exhibited, on behalf of Mr. Lydekker, the mounted skin of an adult male of the Peking deer (*Cervus [Pseudaxis] hortulorum*), recently presented by the president and the Duchess of Bedford to the British Museum. Mr. Lydekker believed that an adult specimen of this fine stag had not hitherto been figured. The specimen was in full summer dress.—Dr. A. Smith Woodward, F.R.S., gave an account of excavations for the discovery of early Pliocene mammalian remains which he had recently made near Concud, in the province of Teruel, Spain. The bones had proved to be very abundant in a bed of freshwater marl, but they were in a much more fragmentary condition than those found at Pikermi, in Greece. He had discovered evidence of Hipparion, Rhinoceros, Mastodon, and of several small antelopes, and exhibited some jaws of the first of these genera.—Mr. F. E. Beddard, F.R.S., exhibited the stuffed skin of an Indian elephant still-born in the Society's menagerie in August last, and made some remarks thereon.—A communication was read from Mr. R. Lydekker, F.R.S., containing a description of the Cabul race of the markhor (*Capra falconeri megaceros*).—Dr. Forsyth Major read a paper on the specimens of the okapi that had recently arrived in Brussels from the Congo Free State. The author stated that these specimens, whilst presenting the same specific characters as the specimens formerly received by the Congo State authorities, showed conclusively that the male was alone provided with horns, and that the mode of their development was the same as in the giraffe. The okapi seemed to be a more generalised member of the Giraffidæ than the giraffe, sharing not a few features of alliance with the Upper Miocene Palæotragus (*Samotherium*). In several characters, it was intermediate between the giraffe and the fossil forms; but, apart from these, some features were pointed out in which it appeared to be even more primitive than its fossil relatives. These last characters went some way to support the assumption that Africa was the original home of the Giraffidæ.—A communication was read from Mr. G. A. Boulenger, F.R.S., containing an account of a second collection of fishes made by Dr. W. J. Anson in the Niger Delta. The species—fifty-six in number—were enumerated, four of them being described as new.—A communication from Dr. A. Günther, F.R.S., contained a final account of the fishes collected by the late Mr. R. B. N. Walker, on the Gold Coast. Several new species belonging to the families Chromidæ, Siluridæ and Cyprinidæ were described.

Anthropological Institute, November 25.—Dr. A. C. Haddon, F.R.S., in the chair.—Dr. C. S. Myers read a paper on anthropometric investigations among the native troops of the Egyptian Army. The investigations were confined to the privates and non-commissioned officers of the Egyptian Army. By permission of the Sirdar, 1005 men in the Egyptian battalion quartered at Cairo and 189 men in the Soudanese battalions at Khartoum and Omdurman were examined. Photographs were obtained of 176 Egyptians and thirty-one Soudanese soldiers bare to the waist; two photographs, one full-face, the other profile, were taken of each individual. In both Egypt and Soudan, the subjects measured had been drawn from a very wide area, extending as far westward as Bornu and Barü, and southwards as far as Uganda. It now remained to determine whether definite differences of type exist among the Egyptians from various regions of the Nile valley and among the tribes of the Soudan; also whether the Coptic (pre-Mohammedan) people noticeably differ from the general Moslem population of Egypt. Before publishing the results of this inquiry, the permission of the Sirdar has to be obtained. The material collected will supply the necessary data to permit of the preparation of a report on the physical efficiency of the Egyptian Army.—The Hon. John Abercromby read a paper on the oldest Bronze-age ceramic type in Britain; its close analogies on the Rhine; its probable origin in Central Europe. The oldest type of pottery in Britain is the "drinking cup," for which it is proposed to substitute the shorter term "beaker." Fifty-three of Thurman's three types were shown. Twenty-five interments were described in which the beaker was accompanied by ancient objects; three with large flint daggers, three with buttons with the V-shaped perforation below and five with stone wrist-guards, all of which objects belong to the later Neolithic period on the con-

tinent. None of the objects found with the remaining fourteen interments are of later date than the thin, flat, broad knife-dagger. As no other ceramic type in Britain can show such a pedigree, it is clear that the beaker is the oldest, though before it died out several other types of fictilia came into use.

Royal Meteorological Society, November 19.—Mr. W. H. Dines, president, in the chair.—Mr. F. Campbell Bayard read a paper on English climatology, 1881-1900, which was a discussion of the climatological data printed in the *Meteorological Record* from the forty stations of the Royal Meteorological Society, which have been continuous for the whole of the twenty years. The elements dealt with by the author are:—(1) temperature at 9 a.m.; (2) mean minimum temperature; (3) mean maximum temperature; (4) relative humidity; (5) amount of cloud; (6) rainfall; and (7) number of rainy days. The results form a valuable contribution to the climatology of the British Isles.—A paper by Mr. C. V. Bellamy, on the rainfall of Dominica, was also read. This was in continuation of a former paper on the subject, and dealt with all the available rainfall data for the Island of Dominica. From this it appears that the mean annual rainfall of the island is 110 inches. In the neighbouring island of Montserrat, a remarkably heavy rainfall occurred during the night of November 28-29, 1896, when as much as 20·13 inches fell in the space of six or eight hours.

CAMBRIDGE.

Philosophical Society, November 10.—Dr. Baker, president, in the chair.—Notes on a vibration magnetometer, and on the ball-ended magnets of Robison, by Mr. G. F. C. Searle. The comparison of the horizontal components of magnetic fields by the method of vibrations presents no difficulty when each field is so nearly uniform that a vibrating magnet several centimetres in length may be used. But when the fields are far from being uniform, the magnet must be quite short. The magnet must in any case be slender, for unless its length be at least ten times its diameter, the magnetic moment varies appreciably when the field varies, even for fields comparable with that of the earth. A simple magnet 1·5 cm. in length and 0·15 cm. in diameter is in many ways practically inefficient. In the vibration magnetometer exhibited to the Society, the magnet is 1·5 cm. in length and 0·15 cm. in diameter. The time of vibration is increased from 1·4 to 6·3 seconds by attaching the magnet to a pointed plumb-bob the mass of which is about fifty times greater than that of the magnet. The bob also carries an aluminium pointer to magnify the motion; this enables the time of vibration to be very exactly determined. Ball-ended magnets were devised by Prof. John Robison, of Edinburgh, about 1770; the author was led, independently, to the same design.—On cavitation in liquids, and its occurrence in lubrication, by Mr. S. Skinner. If water is run into the space between two lenses, arranged so as to show Newton's rings, and if one of the lenses is rolled on the other, a crescent-shaped cavity is developed when the velocity of rolling exceeds a certain critical value. The cavity fills as soon as the rolling ceases. With more viscous liquids, such as lubricating oils or glycerine, the formation of the cavity is more marked. With colourless liquids, the production of the cavity is observed by taking advantage of total internal reflection or by using sodium light and observing the Newtonian rings formed in the cavity. With deeply coloured liquids, the effect may be observed by transmitted light. Instantaneous photographs have been obtained of the effects with lenses rolling on planes, lenses sliding on planes and in some other cases. The effects are shown to agree with Osborne Reynolds's theory of the viscous origin of friction when copiously lubricated surfaces move over one another (*Phil. Trans.* A, 1886). That the maximum negative pressure occurs at some distance from the point of nearest approach is confirmed by these observations, and it appears that the layer of lubricant which separates the surfaces at the point of nearest approach is thinner than the wave-length of sodium light. Cavities of the same character probably occur in all sufficiently lubricated bearings.—On the coral reefs of Pemba Island and British East Africa, by Mr. C. Crossland. The paper shows that the island of Pemba, though very similar in structure to that of Zanzibar, is of separate origin to the mainland, whereas the latter island is a part of the mainland barrier system. The fringing reef of the east coast of Pemba represents an early stage in the formation of that of Zanzibar, while a barrier reef, also a result of erosion, not of growth, encloses large bays on the west coast which are com-

parable to the lagoon of the Bermuda atoll. The mainland of East Africa is bordered by both fringing and barrier reefs, both of which are formed entirely of dead rock, in which physical agencies have in some cases produced miniature atolls. Wherever growing coral occurs in the East African region, it is seen that the physical conditions (*e.g.* the absence of big waves) are not such as to allow the formation of typical reefs. Finally, some observations on the conditions favourable to coral growth were given, which conditions are present round an oceanic atoll to a much greater degree than near a continental area.—On the theory of aggregates, by Mr. A. N. Whitehead.

PARIS.

Academy of Sciences, November 24.—M. Albert Gaudry in the chair.—The velocity of light and the solar parallax, by M. Perrotin. An account of experiments at the Observatory of Nice on the velocity of light. Fizeau's method was used, the total distance traversed by the light being 92 kilometres. As the emission telescope, the 72 cm. objective of the Observatory was utilised, with a 38 cm. objective as collimator. The mean result of 1109 observations was 299,860 kilometres per second in a vacuum. By combining this with the observations on the planet Eros, from which a value of 8"·805 was deduced for the solar parallax, the coefficient of annual aberration was found to be 20"·465, the exact number adopted by the International Astronomical Conference of 1896 at the instance of M. M. Lœwy and Newcomb.—On the origin and geographical dispersion of *Lagomys corsicanus*, by M. Ch. Deperet.—Report on the work accomplished by the Brazilian Commission, under the direction of M. Cruls, on the exploration of the principal sources of the Javary, and for the determination of the geographical coordinates of several points in this region at points common to Peru, Brazil and Bolivia, by M. Lœwy.—Observations of the sun made at the Observatory of Lyons with the Brunner 16 cm. equatorial during the third quarter of 1902, by M. J. Guillaume. Tables are given showing the number of spots, their distribution in latitude and the distribution of the faculæ in latitude.—On monodrome functions with an isolated essential singular point, by M. Edmond Maillet.—On an extension of the notion of periodicity, by M. E. Esclangon.—On an automatic carburettor for explosion motors, by M. A. Krebs. A theoretical investigation as to the manner in which the area of the orifice air should vary with the pressure of the air and the height of the petrol in the reservoir. Following the indications thus obtained, an apparatus has been constructed in which these conditions are fulfilled, and it has been found that the velocity of the motor can be varied suddenly between very wide limits, an absolutely constant gas mixture being obtained.—On the construction of electrodiapasons with long variable periods, by M. E. Mercadier.—On the ionisation of a salt flame, by M. Georges Moreau. The ionisation of the salt flame was found to decrease according to an exponential function of the distance between the electrodes, and the conclusion is drawn that the unipolar conductivity of a saline vapour is analogous to that of a mass of hydrogen surrounding an incandescent carbon filament, or that of a gaseous mass in contact with a metal illuminated by ultra-violet radiations.—Some observations on uranous oxide, by M. Echsner de Coninck. Uranyl bromide, ignited in a current of air, loses its bromine, thus differing from the behaviour of the corresponding chloride.—On the combinations of the complex cyanides with fatty amines, by M. P. Chrétien. A study of the salts obtained by the action of hydroferrocyanic acid upon the primary isd-amyamines.—A method for the estimation of glycerol in wine, by M. A. Trillat. The method is based upon the solvent powers of pure acetic ether for glycerol. The glycerol extracted is much purer than that obtained by the usual alcohol-ether method.—On the structure of the muscles of *Anomia ephippium*, by M. Jobert.—On some new or slightly known forms of Rhabditis, by M. Aug. Michel.—The theory of phytons in Gymnosperms, by M. G. Chauveaud.—On the mode of vegetation and reproduction of *Amlyomyces Rouxii*, the fungus of Chinese yeast, by M. J. Turquet.—The actual production of native sulphur in the subsoil of the Place de la République, in Paris, by M. Stanisla, Meunier. In the course of the excavations for a railway tunnels native crystallised sulphur has been found in a black clay. Reasons are given for supposing that this deposit has been formed during the last two centuries.—On the general theory of the action of some diastases, by M. Victor Henri. Two hypotheses are examined; supposing that a portion of the ferment

combines with a part of the body undergoing hydrolysis, another part combining with a portion of the products of hydrolysis. It may be supposed either that it is the non-combined part of the ferment which acts upon the bodies to be split up, or, on the other hand, that the unstable compound formed is itself decomposed, regenerating a part of the ferment. It is remarkable that both these hypotheses lead to the same law. Experiments are given showing the action of invertin upon saccharose alone and mixed with invert sugar, and of emulsin upon salicin.

NEW SOUTH WALES.

Royal Society, October 8.—Prof. Warren, president, in the chair.—Occurrence of the mineral gadolinite at Cooglegong, Pilbarra District, West Australia, by Mr. Bernard F. Davis.—Pot experiments to determine the limits of endurance of different farm crops for certain injurious substances, part i. (wheat), by Mr. F. B. Guthrie and Mr. R. Helms. The authors describe experiments to test the effect upon the growth of the wheat-plant of certain substances occasionally found in the soil and in manures, and known when present in excessive quantities to act as plant poisons. The following table summarises the principal results obtained.

Effect upon germination and subsequent growth of wheat of different percentages of injurious substance in the soil.

| | Germination affected. | Germination prevented. | Growth affected. | Growth prevented. |
|--------------------------------|-----------------------|------------------------|--------------------------|-------------------|
| NaCl | 0.05 | 0.20 | 0.05 to 0.15 (recovered) | 0.20 |
| N ₂ CO ₃ | 0.30 | 0.5 to 1.0 | 0.10 | 0.40 |
| NH ₄ CNS | 0.005 | 0.01 | 0.001 | 0.005 |
| NaClO ₃ above | 0.01 | 0.05 | 0.001 | 0.003 |
| As ₂ O ₃ | 0.05 | 0.50 | 0.05 | 0.10 |

DIARY OF SOCIETIES.

THURSDAY, DECEMBER 4.

ROYAL SOCIETY, at 4.30.—(1) On the "Blaze-Currents" of the Incubated Hen's Egg; (2) On the "Blaze-Currents" of the Crystalline Lens: Dr. A. D. Waller, F.R.S.—A Contribution to the Question of "Blaze-Currents": Dr. A. Durig.—On the Similarity of the Short Period Pressure Variation over Large Areas: Sir Norman Lockyer, F.R.S., and Dr. W. J. S. Lockyer.—Isomeric Change in Benzene Derivatives. The Interchange of Halogen and Hydroxyl in Benzenediazonium Hydroxides: Dr. K. J. P. Orton.—On the Vibrations and Stability of a Gravitating Planet: J. H. Jeans.

LINNEAN SOCIETY, at 8.—New and rare Corals from Funafuti: G. C. Bourne.—On the Morphology of the Flowers and Fruits of the Xylostem Section of Lonicera: F. A. Newell Arber.—Note on *Carex Tolomiei*, Boott: B. Clarke, F.R.S.—New and old Phalangidæ from the Indian Peninsula: C. With.

RÖNTGEN SOCIETY, at 8.30.—An Observation bearing upon the Therapeutic Action of the Focus Tube: Dr. D. Walsh.—X-Rays in Ophthalmic Work: Stephen Mayou.—Mr. Isenthal will show the Nodon Electric Valve for converting Alternating into Continuous Current.

CHEMICAL SOCIETY, at 8.—The Absorption Spectra of Metallic Nitrates. Part II.: W. N. Hartley.—The Specific Heats of Liquids: H. Crompton.—(1) Studies in the Camphane Series. Part X. The Constitution of Enolic Benzoylcamphor; (2) Note on the Isomeric Benzoyl Derivatives from Isonitrosocamphor: M. O. Forster.—The Constitution of the Products of Nitration of Meta-acetoluidide: J. B. Cohen and H. D. Dakin.

AERONAUTICAL SOCIETY, at 8.—Presidential Address. Recent Aeronautical Progress: Major B. F. S. Baden-Powell.—The Contributions of Balloon Investigations to Meteorology: Dr. W. N. Shaw, F.R.S.—The Kite Equipment of the Scottish National Antarctic Expedition: John Anderson.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Extra Meeting for the Inaugural Address by the President, Mr. J. Swinburne.

FRIDAY, DECEMBER 5.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Erection of Steel Bridges, Sheffield Extension of the London and North-Western Railway: A. Reynolds.

GEOLOGISTS' ASSOCIATION, at 8.—On the Formation of Chert: Miss Catherine A. Raisin. Illustrated by Lantern Slides.—A List of the Fish Remains from the Middle Bagshot Beds of the London Basin: A. K. Coomaraswamy.

SATURDAY, DECEMBER 6.

ESSEX FIELD CLUB (Essex Museum of Natural History, Stratford), at 6.30.—The Non-Marine Mollusca of the River Lea Alluvium at Wathamstow: A. S. Kennard and B. B. Woodward.—Demonstration of the Lumière Process of Colour Photography and its applications to Natural History Work: Edward R. Turner.

MONDAY, DECEMBER 8.

SOCIETY OF ARTS, at 8.—The Future of Coal Gas and Allied Illuminants: Prof. V. B. Lewes.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Three Years' Exploring Work in Central Asia: Dr. Sven Hedin.

TUESDAY, DECEMBER 9.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Discussion of paper on High-Speed Electrical Generating Plant: T. H. Minshall.

WEDNESDAY, DECEMBER 10.

SOCIETY OF ARTS, at 8.—French Rural Education and its Lessons for England: Cloudesley Brereton.

THURSDAY, DECEMBER 11.

ROYAL SOCIETY, at 4.30.—Probable papers:—On Certain Properties of the Alloys of the Gold-Silver Series: The late Sir William Roberts-Austen, F.R.S., and Dr. T. K. Rose.—Abnormal Changes in some Lines in the Spectrum of Lithium: H. Ramage.—An Error in the Estimation of the Specific Gravity of the Blood by Hammerschlag's Method, when Employed in Connection with Hydrometers: Dr. A. G. Levy.—Quaternions and Projective Geometry: Prof. C. J. Joly.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Photometry of Electric Lamps: Dr. J. A. Fleming, F.R.S.

SOCIETY OF ARTS, at 4.30.—Domestic Life in Persia: Miss Ella C. Sykes.

INSTITUTE OF ACTUARIES, at 5.30.—Lecture on Statistics (Measurement of Groups): A. L. Bowley.

MATHEMATICAL SOCIETY, at 5.30.—Application of Matrix Notation to the Solution of Linear Differential Equations: Dr. H. F. Baker.—The Expression of the Double Zeta and Gamma Functions in Terms of Elliptic Functions: G. H. Hardy.—Sets of Intervals. Part II, Overlapping Intervals: W. H. Young.—Series connected with the Enumeration of Partitions: Rev. F. H. Jackson.—The Abstract Group simply Isomorphic with the Group of Linear Fractional Transformations in a Galois Field.

FRIDAY, DECEMBER 12.

ROYAL ASTRONOMICAL SOCIETY, at 5.

CONTENTS.

PAGE

Dr. Nansen's Oceanography of the North Polar Basin. By H. R. M. 97

Animal Histology 98

Philosophy and Science. By A. E. Taylor 99

The Parallel Running of Alternators. By C. C. G. 101

Our Book Shelf:—

Ostwald and Luther: "Hand- und Hilfsbuch zur Ausführung physiko-chemischer Messungen."—H. M. D. 101

Pigott: "London Birds and other Sketches."—R. L. 102

Shelley: "How to Buy a Camera" 102

Ikin: "Recent Advances in Science."—M. S. . . . 102

Dymond: "Agricultural Industry and Education in Hungary" 102

Morel: "Le Ciment Armé et ses Applications" . . . 102

Letters to the Editor:—

Becquerel Rays and Radio-activity.—Lord Kelvin, G.C.V.O., F.R.S. 10

The Conservation of Mass.—Prof. C. V. Boys, F.R.S. 103

Germis in Space.—Sir Oliver Lodge, F.R.S.; Prof. Theo. D. A. Cockerell 103

The Leonid and Bielid Meteor-showers of November, 1902.—Prof. A. S. Herschel, F.R.S. 103

Vitality and Low Temperature.—W. J. Calder . . 104

The British Academy 104

Another Hodgkins Gold Medal Awarded. (Illustrated). 104

Sir William Roberts-Austen, K.C.B., F.R.S. By Dr. T. E. Thorpe, F.R.S. 105

Anniversary Meeting of the Royal Society . . . 107

Notes 110

Our Astronomical Column:—

Observations of the Perseid Shower 114

New Variable Star, 16, 1902, Delphini 114

Evolution of Aërography 114

A Simplified Form of Foucault's Pendulum 114

Physical Chemistry Applied to Toxins and Antitoxins. (Illustrated.) Dr. A. Harden 114

University and Educational Intelligence 116

Scientific Serials 117

Societies and Academies 117

Diary of Societies 120