

Speaking at the Birmingham Chamber of Commerce last week, Mr. Neville Chamberlain said they were on the eve of a new departure in the educational life of Birmingham. They were looking forward to the rise of a University which would take up new and special lines, including commercial education. That was a great experiment, and it seemed to him to be the duty of that chamber, as representing the commercial life of Birmingham, to do what it could to ensure the success of the experiment.

SCIENTIFIC SERIALS.

Bulletin of the American Mathematical Society, October.—The number opens with a partial analysis of the papers communicated at the sixth summer meeting of the Society, held at Columbus, Ohio, in August last, by Prof. Holgate.—The President, Prof. Woodward, congratulated the Society on the manifest interest in mathematical study and investigation as evidenced by the large number (twenty-three) of communications presented.—A report on the recent progress in the theory of linear groups is an interesting and thorough report by Dr. L. E. Dickson, which was made before Section A of the American Association for the Advancement of Science at its meeting at Columbus, previous to the above gathering of the Society. It is a supplement to the previous report, drawn up by Dr. G. A. Miller, which appeared in the February (1899) number of the *Bulletin*. The author restricts himself to finite linear groups, and of these he considers first the finite collineation groups and afterwards the linear congruence groups and the more general groups in Galois fields. These reports are very useful to students of the subject.—A few shorter notices (small reviews) follow.—The "Notes" contain many items of interest, but two of them are not quite accurate. For instance, the London Mathematical Society has *not* decided to issue its *Proceedings* in two volumes per annum. The resolution, as stated in the appendix to Volume xxx., says "in future the volumes of *Proceedings* shall contain as nearly four hundred pages as may be found convenient, provided that each volume shall begin with the report of proceedings at a meeting, not necessarily an annual general meeting." This may sometimes result as in the "Notes," but not necessarily so. A statement on p. 40 would lead one to infer that Dr. Graves was professor at Trinity College, Dublin, at the time of his death, and had been so ever since 1843.

American Journal of Science, November.—March weather in the United States, by O. L. Fassig. If the earth's surface were uniform, the normal circulation of air would produce two belts of high pressure at a latitude of about 30° north and south. The presence of continents breaks up these areas. The author shows that the "permanent" high pressure areas have a great determining influence upon weather in its general aspects, and that a considerable advance in forecasting work may be expected to result from their study. The March weather of the United States is determined by the relative extent of three such areas, and the course of the March storms lies along the gap between them.—Some new minerals from the zinc mines at Franklin, N.J., by S. L. Penfield and C. H. Warren. The minerals include "hancockite," which has the general formula of epidote, but having lead and strontium isomorphous with calcium; "glaucochroite," CaMnSiO_4 , closely allied to monticellite, CaMgSiO_4 ; and its matrix "nasonite," the empirical formula of which is $\text{Pb}_6\text{Ca}_4\text{Cl}_2(\text{Si}_2\text{O}_7)_3$. The authors also investigate the chemical composition of ganomalite, and show that the acid, $\text{H}_6\text{Si}_2\text{O}_7$, of which nasonite and ganomalite are salts, is intermediate between orthosilicic acid, H_4SiO_4 , and metasilicic acid, H_2SiO_3 , and may be regarded as their algebraic sum, or as derived from two molecules of the former by abstraction of water.—Action of acetylene on the oxides of copper, by F. A. Gooch and D. Baldwin. While metallic copper may at comparatively high temperatures induce the polymerisation of acetylene, it is an oxidising action which starts at moderately low temperatures the formation of the peculiar "acetylides." Thus it is found that ferric oxide heated in acetylene at temperatures varying from 150° to 360°, according to circumstances, darkens, glows, and gathers with evolution of heat a dark carbonaceous deposit. In the products of such action the content of iron varies from 2.8 to 5.8 per cent. Silver oxide also acts upon acetylene.—A new mode of occurrence of ruby in North Carolina, by J. W. Judd and W. E. Hidden. Corundum occurs in North Carolina in three

different forms. In the ordinary schists of the district, long prismatic crystals, usually of grey, pink and blue tints, occur. In the peridotites, crystals are found, some of very great size and of great variety of colour, but seldom or never clear and translucent. In certain garnet-bearing basic rocks at Cowee Creek, small tabular and short prismatic crystals are abundant, and these very frequently exhibit the transparency and colour of true ruby.

Wiedemann's Annalen der Physik und Chemie, No. 10.—Explosions in air, by W. Wolff. The effect of an explosion in air is propagated by a process analogous to the propagation of sound, except in the immediate neighbourhood of the source, where a bodily translation of the air is superadded. But that translation does not extend further than about 25 m. Up to that point the propagation of the wave is more rapid than the propagation of sound.—Glow-light phenomena with high-frequency alternate currents, by H. Ebert. There is a residual effect of the positive charge in the glow-light, which persists for a short time after the glow has ceased. This produces a repulsion between the two electrodes.—Influence of impurities upon a gaseous spectrum, by P. Lewis. The addition of very small quantities of mercury vapour to hydrogen gives rise to the green mercury line, which only disappears at -20 degrees. When oxygen is added to hydrogen in increasing quantities, the maximum of emission is shifted towards lower pressures. Resistance to projectiles in air, by R. Emden. The resistance offered by air is jointly proportioned to the square of the velocity, v^2 , and to another function of the velocity, $f(v)$. The latter quantity is constant up to the point where v becomes the velocity of sound. Then it abruptly increases to about three times its former value, remaining constant at high velocities. The increase is due to the energy expended in producing and maintaining the head wave.—Electric pictures, by L. Fomm. The author produces pictures of sections of different kinds of wood by covering them on one side with tinfoil and on the other with bromide paper, with the film in contact with the wood. A metallic point negatively charged by an influence machine, mounted at 5 cm. from the paper surface, produces a good impression in about half a minute.—The Macfarlane-Moore vacuum vibrator, by J. Elster and H. Geitel. To avoid the sticking of the vacuum interrupter the authors keep it vibrating by a separate interrupter outside the vacuum tube, in unison with the one inside.—A fault in Lippmann's photography, by O. Wiener. There is always a difference of phase between the wave reflected by the gelatine surface and that reflected by the first elementary stratum. The remedy consists either in eliminating the surface reflection altogether, as by immersing the plate in benzol, or in producing a large difference of path, by coating the gelatine with a film of collodion. With a suitable thickness of the latter, very brilliant and true effects are obtained.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 15.—"On the Resistance to Torsion of certain forms of Shafting, with special reference to the Effect of Keyways," by L. N. G. Filon, M.A., King's College, Cambridge, Fellow of University College, London.

In this paper solutions of the torsion problem are obtained for cylinders whose cross-sections are bounded by confocal ellipses and hyperbolas. The method employed is that of conjugate functions, suggested by Saint-Venant, Thomson and Tait, Clebsch, Boussinesq and MacDonald, and applied by them to other cases.

The strains and stresses are obtained in the form of infinite series of circular and hyperbolic functions. There are two types of sections specially studied.

The first is bounded by an ellipse and by the two branches of a confocal hyperbola. The solution is worked out numerically for various values of the eccentricity of the ellipse and of the angle between the asymptotes of the hyperbola.

The position of the fail-points, or points of maximum strain and stress, is investigated at length.

It is shown that the maximum stress does not always occur, as is usually assumed, at the point of the boundary nearest to the centre of the section, but that in some cases there are four fail-points symmetrically distributed round the contour, on the broad sides of the section.

An example of this kind has already occurred in Saint-Venant's edition of Navier's "Leçons de Mécanique." This is compared with the present results. The paper also investigates the critical sections when the two cases of four and two fail-points pass into one another. It is shown in particular that when the angle between the asymptotes is less than 73° the greatest stress always occurs at the neck of the section.

The second type of section is bounded by one ellipse and one branch of a confocal hyperbola.

The case in which the confocal hyperbola reduces to a straight slit or thin keyway is specially studied.

For the first type of section this case gives two thin keyways; for the second only one.

The manner in which the reduction of the torsional rigidity, due to cutting such slits into the material, varies with the depth, is very striking. This reduction, which is as great as +23 per cent. when the depth of the keyway is 0.6 (semi-major axis) falls to about 1 per cent. when this depth is 0.12 (semi-major axis). This would account for such keyways not always giving in practice the reduction in torsional rigidity which we should expect from Saint-Venant's results for the circle. Keyways of only moderate depth will affect the torsional rigidity very little.

Finally, the effect on the torsional rigidity of two such equal and opposite slits is shown to be about twice the effect of a single slit.

Chemical Society, November 2.—Dr. W. H. Perkin, Vice-President, in the chair.—The following papers were read: On methods for determining the relative proportions of gaseous chloroform and air in a mixture of the two, and on a method for producing a mixture of air and chloroform in any desired proportion, by A. Vernon Harcourt.—The theory of saponification, by J. Lewkowitsch. It is demonstrated that partially hydrolysed fats contain di- and mono-glycerides, and that the hydrolysis of triglycerides constitutes a bimolecular reaction.—Note on the action of dilute nitric acid upon oleic and elaidic acids, by F. G. Edmed. Dilute nitric acid converts oleic acid quantitatively into elaidic acid.—Formation of tetrazoline, by S. Ruhemann and H. E. Stapleton. A good yield of tetrazoline, $\text{CH} \begin{pmatrix} \text{NH.N} \\ \text{N.NH} \end{pmatrix} \text{CH}$, is obtained by heating monoformylhydrazide.—Asymmetric optically active nitrogen compounds. Dextro- and lævo-benzylphenylallylmethylammonium iodides and bromides, by W. J. Pope and S. J. Peachey. On heating α -benzylphenylallylmethylammonium iodide with silver dextro-camphorsulphonate and acetone, a mixture of the camphorsulphonates of the dextro- and lævo-quaternary ammonium derivatives is obtained. From these salts the corresponding and optically active iodides and bromides may be prepared. It is thus proved that dissolved substances may owe their optical activity to asymmetric nitrogen.—Camphoroxime. Part III. Behaviour of camphoroxime towards potassium hypobromite, by M. O. Forster. Camphoroxime yields, when treated with potassium hypobromite, a nitroso-derivative, $\text{C}_{10}\text{H}_{13}\text{BrN}_2\text{O}$, which is converted into a compound of the composition $\text{C}_{10}\text{H}_{14}\text{BrNO}$ by sulphuric acid; on treating either substance with soda, a nitrite, $\text{C}_9\text{H}_{13}\text{N}$, and an amide, $\text{C}_9\text{H}_{13}\text{NO}$, are produced. The latter seems to be campholytic amide.—Optical influence of an unsaturated linkage on certain derivatives of bornylamine, by M. O. Forster.—The interaction of sodium hydroxide and benzaldehyde, by C. A. Kohn and W. Trantom. Electrolytic preparation of induline dyes, by E. C. Szarvasy. On electrolysing a fused mixture of aniline and its hydrochloride, the following substances are formed: induline, anilidoinduline, induline 6B, and azopenine.—The heat of combination of copper with zinc, by T. J. Baker.—The action of sulphuric acid on fenchone, by J. E. Marsh. 1:2:4-Acetorthoxylylene is produced by the action of sulphuric acid upon fenchone.—On glucosides, by H. Ryan.—Note on polyazo-compounds, by R. Meldola and W. A. Williams.—On ethyl dibromobutane-tetracarboxylate and the synthesis of tetrahydrofurfuran- $\alpha\alpha'$ -dicarboxylic acid, by B. Lean.—The application of powerful optically active acids to the resolution of externally compensated basic substances. Resolution of tetrahydroquinaldine, by W. J. Pope and S. J. Peachey.—The application of powerful optically active acids to the resolution of feebly basic substances. Resolution of camphoroxime, by W. J. Pope.—The application of powerful optically active acids to the resolution of externally compensated basic substances. Resolution of tetrahydroparatoluquinaldine, by W. J. Pope and E. M. Rich.—Homogeneity of dextro-lævo- α -phenethylamine dextrocamphorsulphonate, by

W. J. Pope and A. W. Harvey.—The characterisation of racemic liquids, by F. S. Kipping and W. J. Pope.—A method for discriminating between "non-racemic" and "racemic" liquids, by W. J. Pope and S. J. Peachey.—On two hydrated cobalt oxides, green- and buff-coloured, by W. N. Hartley.—A method of separating isomeric xyliindines from the commercial product, by W. R. Hodgkinson and L. Limpach.—Action of hydrolytic agents on α -dibromocamphor and the constitution of bromocamphorenic acid, by A. Lapworth.

Entomological Society, November 1.—Mr. G. H. Verrall, President, in the chair.—Mr. J. J. Walker exhibited two living specimens of *Bostrychus cornutus*, Fab., obtained from a wooden stool which was brought from Zanzibar.—On behalf of Mr. W. Purley, of Folkestone, Mr. C. G. Barrett exhibited the following species of Lepidoptera:—*Stigmonota trauniana*, *Loxopera beatricella*, *Peronea cristana*, *Cledeobia angustalis*, *Crambus inquinatellus*, var., *Eudoreia dubitalis*, var. *ingratella*, and *Endotricha flammealis*.—Mr. McLachlan showed four examples of *Deilephila lineata*, taken by Mr. E. W. Hainworth at Victor, Colorado, at an elevation of 9000 feet, on July 23, 1899; also an ash-twig which had been girdled by hornets, the observation of this curious fact having been made by Mr. W. C. Boyd, of Cheshunt, from whom he received the twig.—Dr. T. A. Chapman exhibited specimens of *Erebia flavofasciata* taken at Campolungo at an elevation of 7000 feet. He stated that the species occurred only in those places where there was an outcrop of dolomitic strata belonging to the crystalline schists, and was not met with elsewhere at that elevation, nor was it to be found in association with the same strata at lower levels.—Mr. H. J. Elwes exhibited and gave a brief account of a collection of Lepidoptera made by Mrs. Nicholl and himself in a part of Bulgaria which had not previously been visited by entomologists. *Lycaena eroides*, *L. anteros*, *L. zephyrus*, *Melittaea cynthia*, *Erebia gorge*, and *Coenonympha typhon* were a few of several interesting forms to which he directed attention.

Linnean Society, November 2.—Dr. A. Günther, F.R.S., President, in the chair.—Prof. Stewart, F.R.S., exhibited and made remarks on a preparation of the leaves of *Mimosa pudica* showing the diurnal and nocturnal positions. He also exhibited the embryo and egg-cases of *Cestracion Philippi*.—Rev. G. Henslow read a paper on the proliferous state of the awn of Nepal barley. After describing the two varieties *Hordeum coeleste*, vars. *Aegiceras* and *trifurcatum*, he showed that the inverted flower-buds (which constitute the peculiarity of the monstrosity) were different in the two varieties.—Dr. W. G. Ridewood read a paper on the hyobranchial skeleton of the new aglossal toad, *Hymenochirus Boettgeri*. The hyoidean cornua of this animal was shown to be ossified, a fact unique among tailless amphibians.—Mr. Harold Wager read a paper on the eye-spot and flagellum in *Euglena viridis*.

Mathematical Society, November 9.—Lord Kelvin, G.C.V.O., President, in the chair.—The President stated that the Council, as announced at the June meeting, had awarded the De Morgan medal to Prof. W. Burnside, F.R.S. After Major MacMahon, R.A., F.R.S., on behalf of the Council, had stated the grounds of the award, the President presented the medal to Prof. Burnside, who suitably thanked the Council for the honour they had conferred upon him.—The following gentlemen were elected the Council for the ensuing session: President, Lord Kelvin; Vice-Presidents, Prof. Elliott, F.R.S.; Lieut.-Colonel Cunningham, R.E.; Prof. Lamb, F.R.S.; Treasurer, Dr. J. Larmor, F.R.S.; Secretaries, R. Tucker and Prof. Love, F.R.S.; other members, Prof. Burnside, Dr. Glaisher, F.R.S., Prof. Hill, F.R.S., Dr. Hobson, F.R.S., A. B. Kempe, F.R.S., Dr. F. S. Macaulay, H. M. Macdonald, Major MacMahon and E. T. Whittaker.—Prof. Burnside communicated a short note by Dr. L. E. Dickson on the abstract groups isomorphic with the symmetric group on k letters.—Major MacMahon spoke on the fundamental solutions of the indeterminate relation $\lambda x \cong \mu y$.—The following papers were read in abstract. Certain correspondences between spaces of n dimensions, by Dr. E. O. Lovett. (1) On the form of lines of force near a point of equilibrium; (2) the reduction of conics and quadrics to their principal axes by the Weierstrassian method of reducing quadratic forms; and (3) on the reduction of a linear substitution to a canonical form; with some applications to linear differential equations and quadratic forms, by T. J. I. Bromwich: (1) on Ampère's equation $Rr + 2Ss + Tt + U(rt - S^2) = V$, and (2) the theory of auto-

morphic functions, by Prof. A. C. Dixon.—Note on Clebsch's second method for the integration of a Pfaffian equation, by J. Brill.

Zoological Society, November 14.—Dr. A. Günther, F.R.S., Vice-President, in the chair.—Mr. Sclater gave an account of his recent journey to the Cape, and made remarks on the animals he had obtained there for the Society's collection. He also called attention to the desirability of the establishment of a Zoological Garden at Capetown.—Mr. A. Smith Woodward read a communication from Señ. F. Ameghino containing some further notes on *Neomyiodon listai* (*Grypothierium*). Mr. A. Smith Woodward also exhibited, on behalf of Dr. Moreno, the skull and other specimens of this animal lately discovered in the cave in Southern Patagonia where the original pieces of skin had been obtained, and made remarks on them.—Mr. Lydekker exhibited and made remarks on a remarkably fine head of the swamp-deer (*Cervus duvauceli*), obtained by Major C. B. Wood in the Central Provinces of India.—The Secretary exhibited, on behalf of Mr. C. Pole Carew, some malformed horns of the Sambur Deer (*Cervus aristotelis*), obtained by him in the southern province of Ceylon, and read some notes on them sent by Mrs. Carew.—A communication was read from Mr. F. Vaughan Kirby, containing field-notes on the blue-buck of the Cape Colony (*Cephalophus monticola*).—A communication was read from Mr. R. I. Pocock, containing an account of the collections of Arachnids made by Mr. G. L. Bates in French Congo. To this was added a complete list of the species of the same group represented in the British Museum, and descriptions of the new genera and species.—A communication was read from Mr. Stanley S. Flower containing notes on a second collection of Batrachians made in the Malay Peninsula and Siam from November 1896 to September 1898. Forty-nine species, of which fifteen had not been previously recorded from these countries, were enumerated, and the tadpoles of several of them were described for the first time.—Mr. R. Lydekker read three papers dealing with (1) the specific characters of the Chilian Guenal (*Cariacus chilensis*), which previously, from the absence of good specimens of the animal, had been inaccurately given; (2) the skull of a Shark-toothed Dolphin (*Prosqualodon australis*) from Patagonia, in which he pointed out the characters of distinction between that species and the genus *Squalodon*; (3) the results of recent investigations on the dentition of the Marsupial and Placental Carnivores.—A communication was read from Mr. Ernest Gibson, containing field-notes on the Wood-Cat of Argentina (*Felis geoffroyi*), two specimens of which animal had recently been presented to the Society by Mr. William Brown, of Buenos Aires.

CAMBRIDGE.

Philosophical Society, October 30.—Mr. J. Larmor, President, in the chair.—The following were elected officers for the ensuing year: President, Mr. J. Larmor; vice-presidents, Mr. F. Darwin, Prof. A. R. Forsyth, Dr. W. H. Gaskell; treasurer, Mr. Newall; secretaries, Mr. Baker, Mr. Shipley, Mr. Wilberforce; members of Council, Mr. Harker, Mr. Hutchinson, Prof. Liveing, Mr. Skinner, Mr. Gadow, Mr. Sharp, Prof. J. J. Thomson, Mr. Berry, Sir G. G. Stokes, Mr. Bateson, Mr. Seward, Mr. G. T. Walker.—The following communications were made to the Society: On semi-convergent series, by Mr. W. McF. Orr.—An experiment on the condensation of clouds, by Mr. C. T. R. Wilson. The author gave an experimental demonstration of the production of cloud by the contact of layers of moist air of different temperatures.—On the conductivity of gases from arcs and from incandescent wires, by Mr. J. A. McClelland. The first part of this paper contains an account of experiments on the conductivity of gas through which an arc discharge has passed; the second part deals with the conductivity of gas near an incandescent wire. Experiments have been made with an arc between platinum terminals and with an incandescent platinum wire in air, oxygen and carbonic acid gas. The conductivity is shown to be produced by ionisation, and the nature of the carriers, their velocity under an electric force, and other points are investigated. With the arc in air, or oxygen, there is a small excess of positive electricity in the gas taken from the neighbourhood of the arc, and this excess is very great in CO₂; the greater velocity of the negative carriers under electric force causes more of them to be discharged to the terminals of the arc. The velocity of the carriers under electric force is not a constant quantity, but varies with the nature of the arc and the temperature of

the incandescent wire. The velocity diminishes as the temperature is raised; this may be caused by the carriers coming from the wire itself or the arc terminals at these higher temperatures, or by the disintegration of the wire or terminals affording material to condense on the carriers already formed in the gas.—On the secondary Röntgen rays, by Mr. J. S. Townsend. This paper contained an account of experiments made with the rays given out when Röntgen rays fall on metals and other bodies. These rays are of two kinds. The first are rapidly absorbed by the air, and at a distance of one centimetre from the radiating body their power of ionising the air is reduced to one-thousandth of its value at the surface. The rays of the second kind are more penetrating, and extend to a distance of several centimetres from the radiating body. They cannot be considered part of the first kind of rays, as these would only have an effect of $\frac{1}{10^{18}}$ of their initial value at a distance of 6 centimetres, which would be too small to detect.

MANCHESTER.

Literary and Philosophical Society, November 14.—Prof. Horace Lamb, F.R.S., President, in the chair.—Mr. W. E. Hoyle exhibited a series of flint implements, &c., from Egypt, forming part of a large collection obtained by Prof. Flinders Petrie during the past winter in excavating about twenty miles of cemetery in the western desert between Hu and Denderah, and since presented to the Manchester Museum. These belonged to various periods, from prehistoric to Roman. Certain types of knives with very finely notched edges and forked lance-heads are very characteristic of the prehistoric age. One cemetery dates from the Libyan settlements in Egypt at the close of the Middle kingdom, about 2400 B.C. Here the graves were all shallow pits of the form known as "pan graves," in which the bodies were laid in a contracted position, but not all in the same direction. From this were obtained several of the strings of beads exhibited. The shell bracelets are very characteristic of this period. Another large cemetery at Hu began in the sixth dynasty, and contained, besides pottery, a large quantity of beads. One large necklace of five strings was of amethyst, others were of cornelian and garnet, whilst in the other sets were metal beads, which, from their not having corroded, were presumed to have contained a considerable proportion of gold. The collection included a large number of pieces of engraved bone, apparently prepared for inlaying, as well as two beautiful diorite saucers, one circular and the other in the shape of a large *Unio* shell. A block of stone about six inches square, with a circle and two cross-lines on the top, once formed the upper part of a short stone pillar, and is believed to have been a surveyor's mark.

PARIS.

Academy of Sciences, November 13.—M. van Tieghem in the chair.—Observation relating to researches on the diamines, by M. Berthelot. A correction to the paper published on this subject in the last number of the *Comptes rendus*.—The disease attacking carnations at Antibes, by MM. Prillieux and Delacroix. The primary cause of the disease is a fungus, a detailed description of which is given. Artificial cultures could be carried out either on potato or in a drop of nutrient fluid. The species appears to be new, and the provisional name of *Fusarium Dianthi* is given to it.—Researches on acute alcoholism; estimation of alcohol in the blood and tissues, by M. N. Gréhant. The alcohol was introduced into the stomach in measured amounts through a tube, and samples of blood taken at half-hourly intervals were submitted to distillation in vacuo, and the alcohol in the distillates estimated by the bichromate method of Nicloux. In another experiment the animal was killed, and separate analyses made of the brain, muscles, liver, kidneys and blood. The amounts per 100 grams of material were nearly the same, varying between 0.325 and 0.41 c.c. of alcohol.—On congruences of circles and spheres which intervene in the study of cyclic and orthogonal systems, by M. C. Guichard.—On equations of the second order with fixed critical points, by M. Paul Painlevé.—On the generalisation of expansions in continued fractions given by Gauss and Euler, of the function $(1 \times x)^m$, by M. H. Padé.—A new mode of considering the propagation of luminous vibrations through matter, by M. G. Sagnac.—On the spectrophotometry of the electric light, by M. Fernand Gaud. A comparison between the intensities of different portions of the spectrum of incandescent and arc lights with sunlight was made by decomposing each

light by screens of homogeneous colour, and measuring the intensity of the transmitted light with a simple Foucault or Bunsen photometer. The screens were previously carefully examined by Fraunhofer's method, and the wave-length of the light transmitted by the screen exactly determined.—On the atomic weight of the metal in radio-active barium chloride, by Mme. Sklodowska Curie. Fractional crystallisation of barium chloride obtained from uranium minerals gave a salt which concentrated the radio-activity in the least soluble portions. The atomic weight was found to increase with the radio-activity, the maximum value obtained being 145·8 as compared with 137·8 for the inactive barium. These results confirm the original view of the existence of a new element, radium.—On the preparation and properties of the crystallised phosphides of strontium and barium, by M. A. Jaboin. Crystallised strontium phosphide is prepared in a pure state by heating pure strontium phosphate with lamp black in the electric furnace. The phosphide has a dark colour, breaks with a crystalline fracture, and is rapidly attacked by moist air, or by chlorine, at about 30° C. At the temperature of the electric furnace carbon replaces the phosphorus slowly, giving strontium carbide. Barium phosphide is prepared in a similar manner and has corresponding properties.—On the estimation of phosphorus in organic compounds, by M. Ch. Marie. The organic material is destroyed by heating with nitric acid and potassium permanganate, and the phosphoric acid precipitated with molybdate, certain special precautions being necessary.—On some new asymmetric compounds of nitrogen obtained synthetically and possessing rotatory power, by MM. W. J. Pope and S. J. Peachey. α -Benzyl-phenyl-allyl-methylammonium iodide is heated with dextrorotatory sulphate of silver, the silver iodide filtered off, and the resulting salt recrystallised from a mixture of acetone and ethyl acetate. From the less soluble fractions a dextrorotatory form ($M_D = +208^\circ$) is readily isolated, the more soluble salt ($M_D = -87^\circ$) being levorotatory. From these salts a dextrorotatory iodide ($\alpha_D = 52^\circ.4$), bromide ($\alpha_D = +68^\circ.6$), and a levorotatory iodide ($\alpha_D = -51^\circ.4$) and bromide ($\alpha_D = -67^\circ.3$) were obtained. In these compounds the rotatory power is clearly due to the asymmetrical arrangement of the groups round the nitrogen atom.—On the absorption of iodine by plants, by M. P. Bourcet. From a series of analyses of plants grown under identical conditions in soil containing iodides, it was found that certain plants absorb much more iodine than others, some absorbing none at all.—On the morphology and sexual evolution of a parasite of *Hemioniscus balani*, by MM. Maurice Coullery and Félix Mesnil.—On the absorptive power of seeds for moisture, by M. L. Maquenne.—On the origin of the symmetry in crystallised bodies and of polymorphism, by M. Fred Wallerant.—The relations existing between diuretic actions and osmotic properties of the sugars, by MM. E. Hédon and J. Arrous.—On lipase in pathological conditions, by MM. Ch. Achard and A. Clerc.—New experiments relating to the antiphyloxeric disinfection of vine plants, by MM. Georges Couanon, Joseph Michon and E. Salomon.

DIARY OF SOCIETIES.

THURSDAY, NOVEMBER 23.

ROYAL SOCIETY, at 4.30.—(1) Note on the Spectrum of Silicon; (2) Preliminary Table of Wave-lengths of Enhanced Lines: Sir J. Norman Lockyer, K.C.B., F.R.S.—The Colour-Physiology of *Hippolyte varians*: F. W. Keeble and F. W. Gamble.—The Medusæ of Millepora: Prof. S. J. Hickson, F.R.S.

SOCIETY OF ARTS, at 4.30.—Old and New Colombo: John Ferguson.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Cost of Steam Raising: John Holliday.—Influence of Cheap Fuels on the Cost of Electrical Energy: R. E. Crompton.

FRIDAY, NOVEMBER 24.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Openings for Mechanical Engineers in China: The Right Hon. Rear-Admiral Lord Charles Beresford, C.B.

PHYSICAL SOCIETY, at 5.—(1) On the Conductivities of certain Heterogeneous Media for a Steady Flux having a Potential; (2) On the Thermal Conductivities of Mixtures and of their Constituents: Dr. C. H. Lees.

MONDAY, NOVEMBER 27.

SOCIETY OF ARTS, at 8.—Enamelling upon Metals: H. H. Cunynghame.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Desert Sand Dunes: Vaughan Cornish.

INSTITUTE OF ACTUARIES, at 5.30.

NO. 1569, VOL. 61]

TUESDAY, NOVEMBER 28.

ZOOLOGICAL SOCIETY, at 8.30.—On the Hatching-stage of the Land Pagurines: L. A. Borradaile.—General Account of an Expedition to the Gambia Colony and Protectorate in 1898-99: J. S. Budgett.—On the Relations of the Efferent Branchial Blood-vessels to the "Circulus Cephalicus" in Teleostean Fishes: Dr. W. G. Ridewood.—On the Reptiles, Batrachians, and Fishes collected by the late Mr. John Whitehead in the Interior of Hainan: G. A. Boulenger, F.R.S.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Papers to be further discussed: The Waterloo and City Railway; The Electrical Equipment of the Waterloo and City Railway.—And, time permitting, Paper to be read with a view to discussion: Combined Refuse-destructors and Power-plants: C. Newton Russell.

ROYAL PHOTOGRAPHIC SOCIETY, at 8.—Practical Three-colour Lantern Slide Making.

THURSDAY, NOVEMBER 30.

ROYAL SOCIETY, at 4.—Anniversary Meeting.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Bridges for Light Railways: L. H. Rugg.

FRIDAY, DECEMBER 1.

GEOLOGISTS' ASSOCIATION, at 8.—The Zones of the White Chalk of the English Coast. I. Kent and Sussex: Dr. A. W. Rowe.—A New Rhetic Section at Bristol: W. H. Wickes.

CONTENTS.

PAGE

The Applications of Thermodynamics to Chemistry. By Prof. G. H. Bryan, F.R.S. 73

The Continuity of the Erythrean Rift Valley. By J. W. G. 75

Modern Surgery. By D'A. P. 76

Our Book Shelf:—

Merriman: "Elements of Precise Surveying and Geodesy."—Sir C. W. Wilson, K.C.B., F.R.S. 77

Gregory and Simmons: "Experimental Science (Physiology: Section I.)" 77

"Tito Nenci."—W. F. K. 77

Affalo: "Types of British Animals" 77

Letters to the Editor:—

Stockholm International Conference on the Exploration of the Sea.—Prof. W. A. Herdman, F.R.S. 78

The Meteors of Biela's Comet.—E. C. Willis; W. F. Denning 78

Recent Developments of Wireless Telegraphy 78

Some Recent Work of the Marine Biological Association 79

The Old Red Sandstone of Shetland 80

Sir J. William Dawson, C.M.G., LL.D., F.R.S., &c. By H. B. W. 80

The Leonids. By W. F. Denning; Dr. G. Johnstone Stoney, F.R.S., &c. 81

Notes. (Illustrated.) 83

Our Astronomical Column:—

Holmes' Comet (1899 *d*) 87

Comet Giacobini (1899 *e*) 87

Refraction Effect of Comet Swift (1899 *I*) 87

Predominance of Spiral Nebulæ 87

Bulletin Astronomique 87

The Fitting of the Cycle to its Rider. (With Diagrams.) By R. E. Crompton and C. Crompton 87

Note on the Distance to which Explosions are felt and heard. (Illustrated.) By Dr. Charles Davison 91

The Hurter Memorial Lecture 92

University and Educational Intelligence 92

Scientific Serials 93

Societies and Academies 93

Diary of Societies 96