

ebonite, shellac, lampblack, water, and carbon bisulphide must behave towards these rays in the same manner as they have been found to behave towards Röntgen rays.—A new form of mercurial air-pump, and the preservation of the vacuum in Röntgen tubes, by R. W. Wood. The author describes a simple pump consisting of a system of tubes and bulbs containing the vacuum tube in one branch. It is completely closed, and the vacuum is restored at will by simply oscillating the whole apparatus.

Bulletin de la Société des Naturalistes de Moscou, 1895, No. 2.—Contributions to the knowledge of the molecular forces, as a foundation to thermodynamics, by J. Weinberg; fourth part, dealing with capillarity and adhesion.—The development of the occipital region of the lower vertebrates, in connection with the question of metamery of the head, by A. Sewertsoff. An elaborate and suggestive work, in German, with two plates.—On the rotation of the earth, supposed to be fluid in its interior, by Th. Sloudsky, in French.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 4.—“Observations on Atmospheric Electricity at the Kew Observatory.” By Dr. C. Chree.

The primary object of the investigation was to arrive at a more exact interpretation of the records obtained with the Kew electrograph, and to devise improvements in the conditions under which it works. The electrograph curves are intended to give the value of the potential at the point in the air where a water jet issuing from a long pipe breaks into drops. The proximity of a tall building has naturally, however, a large influence on the potential, so that no direct estimate could be made of the true potential gradient, *i.e.* the increase in potential per unit of height in the open.

Some preliminary experiments were made, which may be regarded as verifying Prof. Exner's experimental conclusion that a building under normal conditions reduces the potential in its neighbourhood, as if it formed an integral part of the earth's surface. Subsequently four series of observations were made. The respective seasons were November–December, 1894, March–April, June–July, and October–November, 1895. The observations were taken with a portable electrometer of known scale value, at one or two approximately constant hours, at five or six stations on or near the Observatory.

The results were consistent with the view that such general phenomena as diurnal or annual variation of potential got out with the same instrument at the several stations would show a good agreement.

A comparison was also made between the potentials deduced from the electrograph curves and the readings of the portable electrometer.

The values of the several meteorological elements, at the times of the observations with the portable electrometer, were derived from the Observatory records.

They afforded the opportunity of carrying out a searching investigation into possible connections of the several meteorological elements and the potential gradient. Attention was particularly directed to data bearing on Exner's theory, which connects potential gradient with density of aqueous vapour through a definite formula, departures from which are to be regarded as abnormal and due to disturbing causes. Special attention was also devoted to the possible influence of bright sunshine in reducing the potential gradient, in consequence of the theory proposed by Elster and Geitel.

The results of the investigation seem far from favourable to Exner's hypothesis. They afford a certain amount of general support to Elster and Geitel's theory, inasmuch as on an average potential seemed lower after long previous sunshine. The evidence, however, in favour of a connection between high potential and low temperature, high barometric pressure, low wind velocity, and anti-cyclonic conditions generally, seems about equally strong with that in favour of Elster and Geitel's theory. In each case notable exceptions appeared to any general rule.

Chemical Society, May 28.—Mr. A. G. V. Harcourt, President, in the chair.—Prof. P. P. Bedson delivered the Lothar Meyer Memorial Lecture. The lecturer reviewed Meyer's contributions to our knowledge of the gases contained

in the blood and of the periodic law, and gave an account of the work done by the late German chemist towards promoting the systematic arrangement of inorganic chemistry, pointing out how great had been Meyer's influence on the promotion and advancement of chemical theory during the past thirty years.

June 4.—Mr. A. G. V. Harcourt, President, in the chair.—It was announced that an address is to be presented to Prof. Cannizzaro on the occasion of his seventieth birthday in July next; an address is also being presented to Lord Kelvin on the completion of his fiftieth year as Professor of Natural Philosophy in Glasgow University. The following papers were read:—On magnetic rotatory power, especially of aromatic compounds, by W. H. Perkin. The author describes apparatus used for determining magnetic rotations, and having determined the influence of temperature and dissolution on this property, gives the results of the examination of a large number of compounds of different types. Great differences exist between the magnetic rotations of aromatic and fatty compounds, the nuclei contained in a substance considerably influencing its rotation; frequently the compounds behave as composite molecules, the fatty and cyclic part separately influencing the magnetic rotation; the presence of a carbonyl group connecting the nuclear and fatty groups seems to act as a screen, preventing them from influencing each other. The influence of the nucleus on the rotation is reduced by the presence of electro-negative groups, and increased by that of electro-positive ones; this great liability of the magnetic rotation of the nucleus to change, is connected with the fact of its unsaturatedness, for saturated cyclic compounds behave like ordinary open chains. The so-called values given for atomic refractions or magnetic rotations are not true physical constants, but are merely the average influences which elements or radicles exert in different compounds; this, however, does not detract from their usefulness in determining constitution.—Mononitroguaiacol, by R. Meldola. One mononitro-derivative, probably the para-compound, is obtained by nitrating acetylguaiacol; benzoylguaiacol yields two mononitro-derivatives, probably the ortho- and para-, on nitration. Mononitroguaiacol may be prepared by hydrolysing its acetyl-derivative.

Linnean Society, June 4.—Anniversary Meeting.—Mr. C. B. Clarke, F.R.S., President, in the chair.—The Gold Medal of the Society was formally awarded to Prof. G. J. Allman, F.R.S., for distinguished researches in zoology, and, in consequence of his inability to receive it in person, was delivered on his behalf to Sir Joseph D. Hooker, K.C.S.I., who made a suitable acknowledgment. The Treasurer then presented his annual statement of accounts. The Secretary reported the deaths, withdrawals, and elections during the past year. The report of the Librarian having been read, the President opened the chief business of the evening, when the Fellows present proceeded to ballot for the President, Officers, and Council for the ensuing year. Scrutineers having been appointed, and the votes counted, the result was declared to be as follows:—President, Dr. Albert Günther, F.R.S.; Treasurer, Mr. Frank Crisp; Secretaries, Mr. B. Daydon Jackson and Prof. G. B. Howes. The retiring President, Mr. C. B. Clarke, then delivered the annual presidential address, which on the motion of Mr. W. Carruthers, seconded by Mr. W. P. Hiern, it was resolved should be printed and circulated.

Mathematical Society, June 11.—Major MacMahon, R.A., F.R.S., President in the chair.—The Chairman announced that the Council had awarded the De Morgan Memorial Medal to Mr. S. Roberts, F.R.S. He also read an address which the Council had requested him to present to Lord Kelvin on the occasion of the jubilee celebration on the 16th instant. The address, which was illuminated, was placed for inspection on the table. The following communications were made:—Waves in canals, by H. M. Macdonald; on the *a, b, c* form of the binary quintic, by J. Hammond; construction for the four normals to a central conic drawn through a given point, by Prof. Mathews; on a two-fold generalisation of Stieltjes' theorem, by Dr. Taber; notes on magic squares, by Rev. A. H. Frost.

Entomological Society, June 3.—Dr. D. Sharp, F.R.S., Vice-President, in the chair.—Mr. Gervase F. Mathew exhibited the new species of *Leucania*, *L. flavicolor*, recently described by Mr. Barrett (*Ent. Monthly Mag.*, 2nd series, vol. vii. p. 99), and also the varieties of *L. pallens* noticed by Mr. Barrett in the same article (*l. c.*, p. 100). Mr. Tutt having carefully examined the specimens of *Leucania flavicolor*, said that he considered it

as highly probable that it was a remarkable form of *Leucania pallens*, but that more material was required before a final opinion could be formed. The remarkable transverse (elbowed) line of dots crossing the forewings was exactly parallel with that of *Leucania straminea* and *L. impura* ab. *punctilinea*, and for an aberration of this character to occur in *L. pallens* was as probable as in *L. impura*, the typical form of which is but sparingly dotted in the direction of the elbowed line. The hindwings showed almost identically the same characters in the dark shading, traces of dots in nervures, &c., as the red aberrations of *L. pallens* exhibited by Mr. Mathew. He considered that until the matter of its specific distinctness was finally settled, Mr. Barrett had erred on the right side in giving it a distinctive name, even if the name subsequently fell as an aberration of *L. pallens*.—Mr. Waterhouse exhibited several branches of oaks from the New Forest entirely denuded of foliage, and stated that throughout large tracts of the forest the oaks had been stripped of their leaves in the same fashion by Lepidopterous larvæ, especially *Cheimatobia brumata*, *Hybernia defoliaria*, and *Tortrix viridana*. Certain trees, however, though situated among the denuded trees, had quite escaped. Dr. Sharp suggested that they belonged to a different species; but Mr. Waterhouse said that he had carefully examined them, and that this was not the case. Mr. McLachlan said that the immunity of the trees referred to was probably due to irregularity in coming into leaf.—Mr. Tutt exhibited living pupæ of *Enodia hyperanthus* and *Epinephele ianira*, and pointed out how different the pupæ of these two species were in general appearance, structure, and cremastral attachment from each other. He pointed out that these two species had for a long time been erroneously placed in the same genus, but that, in all stages, they were widely separated, and that not only should they be placed in different genera, but that they appeared to belong to different tribes—*Enodia hyperanthus* being in the *Cenonymphidi* and *Epinephele ianira* in the *Epinephelidi* (vide *Entom. Record*, vii. p. 301).—Mr. Blandford exhibited and described series of tropical American butterflies from the Godman-Salvin collection, arranged to show the existence and geographical distribution of homœochromatic groups.—Dr. Chapman communicated a paper on the phylogeny and evolution of the Lepidoptera from a pupal and oval standpoint.

Geological Society, June 10.—Dr. Henry Hicks, F.R.S., President, in the chair.—On foliated granites and the relations to the crystalline schists in Eastern Sutherland, by J. Horne and E. Greenly. The crystalline schists of Eastern Sutherland are traversed by great numbers of granitic intrusions, chiefly in the form of lenticular sills. These generally lie parallel to the foliation-planes of the schists, but transgressive junctions are also frequent. Thin seams of granite also occur in such abundance as to constitute with the schists a banded gneissic series; but these seams can often be seen to transgress the schistose folia, and even often to proceed from large masses of granite. The granites contain numerous inclusions of the schists which they traverse, such inclusions retaining, usually, the dip and strike of the surrounding rocks. There are no chilled edges; and, moreover, the component crystals of schist and granite mutually interlock along the line of junction. The authors gave an account of the foliation of the granite. In some rare cases a foliation parallel to that of the schists traverses granite-veins. It is generally, however, parallel at once to the sides of the sill and to the foliation of the schists; and many of the structures are the remains of biotite folia belonging to schists whose quartzo-felspathic elements have been incorporated with those of the granite. But many sills or veins, traversing the schists at various angles, are foliated parallel to the line of junction, and so discordantly to the structures in the schists; and foliated granites may even be observed to cut each other's foliation. These can hardly be anything but original igneous structures; but, if coexistent with the last-named, would be indistinguishable from it. The country-rocks are various types of biotite-schist or gneiss, with quartz-schists at Kildonan, and a scapolite-limestone at Armadale. They are almost all holocrystalline, but it is certain that sedimentary rocks enter into the complex. The whole series is powerfully folded. The granites increase in size and numbers north-westward from Kildonan; the intimate intrusive relations above described becoming more highly developed in the same direction. The schists, at the same time, become more and more highly crystalline, sillimanite also appearing in them. About Kinbrace they are coarse sillimanite-biotite-

gneisses, with large striated felspars. Igneous contact was not held to be the sole origin of metamorphism, though the cause which brought about the introduction of the granites had evidently also produced these high types of crystallisation. The evidence of powerful movement which the schists everywhere present suggested that such movement was the initial cause of the whole series of phenomena. Movement recurred throughout, though all cataclastic structures (if such existed) had been wholly effaced by crystallisation; introduction of granite being the final stage in the production of the complex, and a high temperature (as shown by the absence of chilled edges) being maintained to the very end. With regard to the granites, the authors found it difficult to believe that they are wholly foreign matter, but remark that it is necessary to observe the utmost caution with reference to it.—The geology of the eastern corner of Anglesey, by E. Greenly.—Seismic phenomena in the British Empire, by M. F. de Montessus de Ballore, Captain of Fortress Artillery at Belle-Ile-en-Mer. The author gave a brief outline of a plan that he has elaborated for studying seismology. He has separated his work into four parts: (1) The formation of an earthquake catalogue. (2) Refutation of the empirical laws previously enunciated. (3) Description of the globe from a seismological point of view. (4) Investigation of the characters which differentiate stable from unstable regions. He gave a method by which the relative *seismicity* (or instability as regards earthquakes) of regions may be obtained and registered, and indicated some of the results which he had derived from his study, including the intimate relationship between instability and surface-relief, and the independence of seismic and volcanic phenomena. The main part of the paper was a section of the third division of the author's work, and dealt in detail with the earthquakes of the British Empire. In this part of the paper, the recorded earthquakes of the British Isles, India, Australia and New Zealand, British Africa, Canada, and various scattered possessions were described.

EDINBURGH.

Royal Society, June 15.—Prof. Geikie in the chair.—Mr. A. T. Masterman read a note on the structure of *Actinotrocha* considered in relation to the chordate affinities of *Phoronis*. In this paper, the author demonstrated the presence of a paired notochord in *Actinotrocha* which atrophies before the adult stage is reached, probably at the metamorphosis. He also showed the presence of five body-cavities in the larval stage. For these and other reasons he claimed for *Phoronis* a place among the Chordata, and proposed to place it in a separate division of this group—the Diplochordata. The relationship of *Phoronis* to *Balanoglossus* may be compared to that of the *Tunicata* to *Amphioxus*.—Prof. Tait read a paper on Clerk-Maxwell's law of distribution of velocities in a group of equal colliding spheres. He adverted to the extraordinary denunciation by M. Bertrand of Clerk-Maxwell's proof of the fundamental law of the kinetic theory of gases. He showed that Maxwell's proof involved none of the absurdities alleged by M. Bertrand, and that the gist of the matter was this:—There is a *unique* solution of the problem: Maxwell's is a solution, because it is not interfered with by collisions; therefore it is the solution.—Prof. Chrystal gave a summary of a paper on the ρ discriminant of a differential equation of the first order, in which he applied Newton's method of approximation (first employed in the theory of differential equations by Briot and Bouquet) to prove some leading theorems regarding the ρ discriminant locus, most of which had previously been established by Darboux by other methods. He showed that the ρ discriminant locus (A), $\phi(x, y, \rho) = 0$, $\phi_\rho(x, y, \rho) = 0$ is, in general, a cusp-locus for the family of integral curves. He also established that the locus, $\phi(x, y, \rho) = 0$, $\phi_x(x, y, \rho) + \rho\phi_\rho(x, y, \rho) = 0$, is in general an inflexion-locus (B), and that $\phi(x, y, \rho) = 0$, $\rho\phi_x(x, y, \rho) - \phi_\rho(x, y, \rho) = 0$ is a locus of inflexions on the orthogonal trajectories of the integral family (C). Any point of intersection of A and B, is, in general, a point at which two integral curves touch each other, and also touch A. The necessary and, in general, sufficient condition for an envelope singular solution is that A and B have a branch in common. The necessary and, in general, sufficient condition that two integral curves touch, and do not touch A, is that A, B, C have a point in common. The necessary and, in general, sufficient condition for a tac-locus is that A, B, C have a branch in common; the characteristic of this branch appears as a squared factor in the ρ discriminant. Prof. Chrystal then proceeded to refute a proposition of Cayley's, "that a differential equation of the first

order, which has no singular solution, cannot have an algebraic integral." He showed that Cayley's proof that every algebraic family has a proper envelope, on which this conclusion regarding differential equations depends, fails to take account of the fact that the residual points of intersection, $m + n$ in number, may be concentrated in isolated points, usually tac-points; and produced examples of cubic and quartic families which, in point of fact, have no proper envelope.—Prof. Ewart gave a summary of a paper by Mr. Frank J. Cole, on the cranial nerves of *Chimera monstrosa*, with a discussion of the lateral line system, and of the comparative anatomy of the chorda tympani nerve.

PARIS.

Academy of Sciences, June 15.—M. A. Cornu in the chair.—Formula for the mean local pressures in a fluid moving irregularly or in vortices, by M. J. Boussinesq.—On the variations observed in the composition of apatites, by M. Adolphe Carnot. In Canadian apatites some of the calcium fluoride would appear to be replaced by calcium carbonate without change of crystalline form. In some apatites from the Tyrol, which presented the crystalline properties of normal apatite, the amount of calcium fluoride is reduced to about one-tenth of that usually present.—On the presence of *Campodea staphylinus* (Westwood) and *Sabacon paradoxus* in the cave of Dargilan (Lozère), by M. Lannelongue.—Remarks on the preceding communication, by M. E. Blanchard.—On the value as food of bread from different specimens of screened flour, by M. A. Girard. From a comparative study of the amounts of phosphorus in various samples of bread, the conclusion is drawn that there is no real justification for the use of brown bread in preference to white, when the digestive organs are in a healthy state.—Observations and remarks on the bactericidal power of blood serum, and on the bactericidal substance contained in it, by M. S. Arloing. The experimental results obtained do not appear to sustain the idea of a specific substance in the serum of bactericidal properties. It was found that solutions of many salts could replace the solution of common salt as a diluent of the serum without appreciably affecting its action upon bacteria.—Measurement of the work expended in driving a bicycle, by M. Bouny. The work done was measured by a pedal of special construction containing two dynamometers, arranged so as to register the force exerted in two directions at right angles to each other, and also so as to take into account the effect produced by the deviations of the pedal from the horizontal plane. The work done by the pressure on the pedal is given as a function of the speed. To double the velocity (17 to 33 kilometres per hour) more than trebled the work required to be done.—Remarks on the preceding communication, by M. Marey.—On apsidal surfaces, by M. A. Mannheim.—On the theorem stated by M. P. H. Schoute in the *Comptes rendus* of May 18, by M. D. J. Korteweg. A simplification of one part of the demonstration of this theorem.—On the note of M. P. H. Schoute, entitled "The area of parabolas of higher order," by M. G. Mannoury.—On the method of least squares, by M. Jules Andrade.—On multiple resonance of electric oscillations, by M. Nils Strindberg. An experimental study of the theory of MM. Poincaré and V. Bjerknes on the phenomena of multiple resonance, discovered by MM. Sarasin and De la Rive. By the use of a new form of electro-dynamometer based upon the Joule effect, it has been found possible to determine completely the form of the curves of interference. Qualitatively, the results obtained verify the above theory.—Non-isotropic magnetisation of crystallised magnetite, by M. Pierre Weiss. From the fact that magnetite crystallises in the cubic system, complete symmetry of magnetic properties in all directions might be expected. The experiments detailed, however, show that this is not the case.—On the surfusion of water, by M. J. Passy. It is possible to produce a precipitate in surfused solutions without causing crystallisation to begin.—On the diurnal variation in rain, by M. A. Angot. In summer the maximum amount of rain at Paris falls between 3 p.m. and 6 p.m. In winter the maximum, which is not so well marked, appears to be between 6 a.m. and 9 a.m. In March, April, October, and November there is no appreciable daily variation.—Dissociation spectra of fused salts. Alkali metals: sodium, potassium, lithium, by M. A. de Gramont.—On the reproduction of colours in chromatography, and on a simple system of colour notation, by M. Steinheil.—On a reaction of cuprous compounds serving as a characteristic test for nitrites, by M. Paul Sabatier. A solution containing a nitrite, treated with concentrated sulphuric acid

and a little cuprous oxide, gives a characteristic violet colouration.—On the zirconotungstic compounds, by M. L. A. Hallopeau.—Synthesis of natural methylheptenone, by MM. Ph. Barbier and L. Bouveault.—Contribution to the study of the anterior region of the digestive apparatus of the higher Stenoglossia, by M. A. Amaudrut.—Artificial reproduction of a chlorocarbonate of sodium and magnesium, and a double carbonate of the same bases. Artificial reproduction of darapskite and hydrargylite, by M. A. de Schulten.—On the rare minerals of the glacier of Meije, by M. A. Lacroix. The minerals include anatase, brookite and turnerite.—Chalk containing hippurites of the eastern province, by M. H. Douville.—On the presence of a genus allied to *Caprina* in the limestone at Chateaufeu-du-Rhône (Drôme), by M. V. Paquier.—On the relations between thermal sensibility and temperature, by M. C. Henry.—Action of the porcelain filter upon snake venom; separation of the toxic substances and vaccinal substances, by M. C. Phisalix.—On some derivatives of diphenylethylene diamine, by M. C. Gassmann.—Studies on peridinitronaphthalene, by the same.—On a method of observing sun-spots, by M. Bougon.

BOOKS AND SERIALS RECEIVED.

BOOKS.—Report of the Sixth International Geographical Congress held in London, 1895 (Murray).—Statistical Atlas of India, 2nd edition (Stanford).—Rivers and Canals: L. F. Vernon-Harcourt, 2 Vols., 2nd edition (Clarendon Press).—Domestic Science Readers: V. T. Murché, Book 3 (Macmillan).—The Story of Electricity: J. Munro (Newnes).—Hegel's Philosophy of Right: translated by Dr. S. W. Dyde (Bell).—Das Süßwasserplankton: Dr. C. Apstein (Kiel, Lipsius).—Voxometric Revelation: J. Abner for A. A. North (Authors' and Printers' Joint Interest Publishing Company).—Text-Book of Zoology: Dr. J. E. Boas, translated by J. W. Kirkaldy and E. C. Pollard (Low).

SERIALS.—Economic Journal, June (Macmillan).—Royal Natural History, Part 32 (Warne).—Madras Government Museum, Bulletin No. 4 (Madras).—Journal of the Institution of Electrical Engineers, June (Spon).—Lloyd's Natural History. British Birds. Part 2 (Lloyd).—Himmel und Erde, June (Berlin).

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