

George W. Card. Mining (1st Class): John W. Sharwood, Arthur M. M. Cooke. (2nd Class): Cæsar Bello, John Leechman, Andres Franchy, John H. Grant.

SCIENTIFIC SERIALS.

American Journal of Mathematics, vol. ix. No. 4 (Baltimore, June 1887).—The number opens with a further instalment of Prof. Sylvester's lectures on the "Theory of Reciprocants" (pp. 297-352), which grow in interest as we approach their close—promised in a subsequent number. Lectures xxv. to xxxii. are reported as before by Mr. Hammond, and are accompanied by the lecturer's notes.—M. Maurice d'Ocagne (pp. 354-80) in a paper "Sur une Classe de Nombres remarquables," discusses properties of the numbers symbolically represented by K_m^p . Form a table of squares, as in the case of Pascal's arithmetical triangle, putting in the top left corner K, and in the vertical and horizontal lines the successive numbers 1, 2, 3 . . . The K-numbers will then be, first row 1, second row, 1 1, third row 1 3 1, fourth row, 1 7 6 1, fifth row, 1 15 25 10 1, and so on; the law of formation being, "Multiply the number of the p th column of the q th row by the number of the column, and add to the result the number in the $p-1$ th column of the q th row to get the number in the p th column of the $q+1$ th row": thus, in the above, $15 = 2 \cdot 7 + 1$, $25 = 3 \cdot 6 + 7$, $10 = 4 \cdot 1 + 6$. These numbers, like those of Bernoulli and Euler, frequently occur in analysis. Many curious results are obtained.—We next have "Extraits de Deux Lettres adressées à M. Craig par M. Hermite" (pp. 381-88). These notes are upon a definite integral formula of Fourier, upon a formula due to Gauss, and upon a formula first given by Weierstrass (an expression for the sine by a product of prime factors).—The volume closes with a notelet by Prof. Franklin, entitled "Two Proofs of Cauchy's Theorem."

Rivista Scientifico-Industriale, April 30.—Recent progress in the theory of the microscope, by Dr. Aser Poli. Reference is made more especially to the labours of Abbe, Helmholtz, Crisp, and others, which have been either originally published or reproduced in the Journal of the London Royal Microscopical Society during the last ten years.—On the electric conductivity of gases and vapours, by Prof. Giovanni Luvinì. This is a reply to Prof. Edlund, of Stockholm, who has recently urged several arguments against the author's views regarding the non-conductivity of gases and vapours. These arguments are examined in detail, and it is shown generally that, being mainly based on theoretic grounds or gratuitous assertions, they cannot affect the conclusions to which the author has been led by carefully conducted experiments.—Celestine of Montecchio Maggiore, by G. Bettanini. Preparatory to a complete study of this mineral, a brief description is here given of its crystalline forms and general physical properties. Its specific gravity is shown to be $3 \cdot 965$ at a temperature of 14°C .

Bulletin de l'Académie Royale de Belgique, May.—A new reptile discovered in the Aix-la-Chapelle district, by the Abbé G. Smets. Considerable interest attaches to this discovery recently made in a sandpit at Moresnet, a comparison with the Dinosaurs brought to light in the chalk formations of the New World showing that it is a carapaced Hadrosaurian, the first representative of this family yet found in the eastern hemisphere.—On the electrical phenomena of the excitatory process in the heart of the dog, by Léon Frédéricq. This elaborate paper is introduced by an historical summary, from the discovery of the negative variation of the heart of the frog by Kölliker and H. Müller down to the recent studies of Sanderson and Page, with an account of the stroboscopic method employed by Martins to demonstrate the simple nature of the electric variation of the heart in the dog and rabbit. This is followed by a full description of the apparatus employed and experiments made by the author, who has investigated the subject by means of an electrometer modelled on that described by Lovén. A detailed account is added of the results of these researches, illustrated by a series of photographic diagrams.—The solar eclipse of October 29, 1886, observed on the Congo, by A. Merlon. These observations were taken with great care in $3^\circ 7' \text{S}$. latitude above the Congo-Kassai confluence to the north of Kwamouth. By means of the data obtained and here supplied, the longitude of the point of observation may now be accurately determined. The instruments used were Abbadie's theodolite, Leroy's chronometer, and Fortin's barometer.

Rendiconti del Reale Istituto Lombardo, June.—On the sulphate of copper, as a remedy against the mildew of the grape-vine, by Prof. E. Pollacci. A crucial chemical experiment is described, showing that the sulphate of copper cannot pass from the grape to the wine except in the minutest quantities. Some critical remarks are added on various other remedies recently proposed against diseases of the vine.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 16.—"The Electromotive Properties of the Electrical Organ of *Torpedo marmorata*." By Francis Gotch, B.A., B.Sc. London, M.A. Oxon. Communicated by Prof. Burdon Sanderson, F.R.S.

After an introduction, in which the author sets forth the present state of knowledge with reference to the electromotive properties of the electrical organ of *Torpedo*, he gives an account of his own experimental investigations in three sections.

The first section relates to the nature of the changes produced in the electrical organ by mechanical injury and by heat, and the relation of these changes to those which manifest themselves under similar conditions in muscle and nerve, a subject which has not hitherto been inquired into.

In the second, the duration and the character of the response of the electrical organ to stimulation of its nerve are investigated for the first time by means of the rheotome and galvanometer.

In the experiments which are recorded in the third section, the author has entered on the examination of the after-effects which are produced in the organ by the passage through it of voltaic or induction currents, a subject which has been recently investigated by Du Bois-Reymond.

The author is led by his experiments to believe that the physiological effects produced in the organ by injury, by the passage of currents, and by the stimulation of the electrical nerve, are, notwithstanding that they differ so widely from each other in distribution, duration, and intensity, all phenomena of excitation.

Physical Society, June 25.—Mr. Shelford Bidwell, F.R.S., Vice-President, in the chair.—The following communications were read:—Note on magnetic resistance, by Prof. W. E. Ayrton, F.R.S. and Prof. J. Perry, F.R.S. In the spring of 1886 the authors made experiments on the magnetic induction through horse-shoe electro-magnets when excited by constant currents. The inductions through different armatures and air spaces were also measured. The results show that for small exciting powers the law of parallel resistances is true for magnetism, taking leakage into account. From experiments made with two electro-magnets, the poles of which were placed at different distances apart, the authors conclude that the magnetic resistance of air is proportional to length, or to length plus a constant. A note on magnetic resistance was read before the Society on March 12, 1887, by the same authors, describing experiments on two iron rings, one whole and the other divided by a radial saw-cut. Since then the experiments have been repeated with great care by Colonel Swinton and Mr. Sörenson, of the Central Institution. The resulting curves agree with those previously obtained. On measuring the air space it was found considerably less than estimated, and the magnetic resistance of air relative to iron (assuming no "surface resistance") comes about 1500. Experiments made with different air spaces together with the above seem to show a considerable "surface resistance." Prof. S. P. Thompson thought dynamo-makers had evidence of such "surface resistance" from the care exercised in avoiding joints in the magnetic circuit wherever possible, and Mr. Bosanquet mentioned some experiments he had recently made on the resistance of joints during the various stages of fitting. The changes of resistance are very large, and he concludes that, however good the fit, it is not possible to reduce the surface resistance to a negligible quantity.—On sounding coils, by Prof. W. Stroud and Mr. J. Wertheimer. The paper describes experiments on coils and helices of wire which emit sounds when variable electric currents are passed through them. The pitch depends on the frequency of the current variations. The authors believe the sounds due to the attractions of adjacent parts of the wire which cause shortenings and lengthenings as the current increases or decreases. To prove this, two identical coils were made, and

one of them embedded in plaster of Paris. This gave no sound when the variable current was passed, whilst the other emitted the usual note. It was also found that no sound could be got from a single turn of wire, whilst one and a quarter turns gave an audible sound under the same conditions.—On comparing capacities, by Mr. E. C. Rimington. This is an investigation of the conditions under which the integral current through a galvanometer in a balanced Wheatstone's bridge is zero, when the battery circuit is broken; two adjacent arms, A and D, of the bridge being shunted by condensers of capacities K_1 and K_2 .

It is shown that $\frac{K_1}{K_2} = \frac{C}{B}$, where C and B are the resistances of the arms opposite to A and D respectively. If A and D be made infinite, the necessity of balancing for steady currents is obviated; but if either of the condensers has an appreciable leakage, corrections are required. The best resistance to give to the galvanometer is shown to be $G = \frac{B(C+D)}{B+C}$, and the conditions under which a telephone may replace the galvanometer are $\frac{K_1}{K_2} = \frac{C}{B}$. The case where all the arms have self-inductions is investigated.—On the effects of change of temperature in twisting or untwisting wires which have suffered permanent torsion, by Mr. Herbert Tomlinson. The author's attention was re-directed to the subject by the note read by Mr. Bosanquet on May 14. Some eight years ago he made experiments on such wires, and upon the effects due to changes produced in the thermal expansibility of the metals, by permanent elongation or compression. Thus if a small square be drawn on the surface of a wire, and the wire subjected to permanent torsion, the square becomes a rhombus, the longer diagonal of which suffers permanent extension, and the shorter diagonal permanent compression. If permanent extension causes an increase in thermal expansibility, and compression a decrease, then a rise of temperature will cause the wire to twist more, and *vice versa*. With annealed iron wires which have suffered permanent torsion, remarkable effects take place at about a red heat. On heating such a wire, it untwists slightly until a bright red heat is attained, when a sudden twist takes place. On cooling, a sudden untwist occurs at about the same temperature. These effects have been previously observed by Prof. Barrett, who believes them to be connected with the sudden changes in the magnetic properties of iron, and to take place at the same temperature. This latter conclusion was found to be erroneous, for the author exhibited experiments showing that the magnetic change takes place at a temperature decidedly lower than that at which the jerks above referred to, occur.—On permanent magnet ammeters and voltmeters of invariable sensibility, by Prof. W. E. Ayrton, F.R.S., and Prof. J. Perry, F.R.S. The sensibility of ordinary permanent magnet ammeters and voltmeters increases as the strength of the magnet decreases, whereas in those of the Deprety-D'Arsonval type (in which a suspended coil controlled by torsion swings between the poles of a permanent magnet) the reverse effect takes place. By combining the two systems, the authors have devised instruments whose sensibility is unaltered by changes in the strength of the magnet. The torsional control of the D'Arsonval is removed, and a small permanent magnet attached to the swinging coil. As the large permanent magnet changes, the controlling and deflecting forces change in the same proportion, and the deflection for a given current remains unaltered.

Zoological Society, June 23.—Prof. W. H. Flower, F.R.S., President, in the chair.—Mr. Sclater exhibited the skin of a White-nosed Monkey of the genus *Cercopithecus*, lately living in the Society's Gardens, which appeared to be the *C. ascanius* of Schlegel. It had been obtained by the Rev. W. C. Willoughby from the west shore of Lake Tanganyika, East Africa.—Mr. Sclater also exhibited and made remarks on a specimen of the Pheasant from Northern Afghanistan lately described by him as *Phasianus principalis*.—An extract was read from a letter addressed to the Secretary by Mr. A. H. Everett, of Labuan, reporting the return of Mr. John Whitehead from his expedition to Kina-Balu Mountain, in Northern Borneo, with specimens of some fine new birds, mammals, and other objects of natural history.—Dr. Günther, F.R.S., exhibited and made remarks on a hybrid Pheasant, between a male Golden Pheasant (*Thaumalea picta*) and a female Reeves's Pheasant (*Phasianus reevesi*). Dr. Günther also exhibited a living hybrid Pigeon, produced by a male white Fantail Pigeon and a female Collared Dove (*Turtur risorius*).—Dr. Günther, F.R.S., read a

report on the zoological collections made by Capt. Maclear and the other officers of H.M.S. *Flying-Fish* during a short visit to Christmas Island. This island is situated in the middle of the Indian Ocean, south of Java, and had never been before visited by naturalists. The collection, which had been worked out by the staff of the British Museum, consisted of ninety-five specimens, amongst which were examples of two mammals, two birds, two reptiles, two mollusks, two Coleoptera, two Lepidoptera, and a Sponge, new to science.—Mr. F. E. Beddard read a paper on *Myrmecobius fasciatus*, in which he described a remarkable glandular structure stretched across the anterior region of the thorax of this marsupial.—Prof. F. Jeffrey Bell read the sixth of a series of studies on the Holothuridea. The present paper contained descriptions of several new species belonging to the genera *Cucumaria*, *Bohadschia*, and *Holothuria*.—Mr. A. Smith-Woodward read a paper on the fossil teleostean genus *Rhacolepis*. The author gave a detailed description of this Brazilian fossil fish, which had been named and briefly noticed by Agassiz. Three species were defined, and the author showed that the genus had hitherto been erroneously associated with the Percoids and Berycoids. He considered it an Elopine Clupeoid.—A communication was read from Mr. James W. Davis containing a note on a fossil species of *Chlamydoselachus*. The author pointed out that some teeth from the Pliocene of Orciano, Tuscany, figured and described by R. Lawley in 1876, were referable to this newly-discovered genus of Sharks. He named the fossil species *C. lawleyi*.—Mr. Frank E. Beddard read the fourth of a series of notes on the anatomy of Earthworms. The present communication treated of the structure of *Cryptodrilus fletcheri*, a new species from Queensland.—A communication was read from Mr. Roland Trimen, containing observations on *Bipalium kewense*, of which worm he had obtained many specimens from gardens at the Cape.—Dr. Günther gave the description of two new species of fishes from the Mauritius, proposed to be named *Platycephalus subfasciatus* and *Latilus frontinectus*.—Mr. Sclater read a note on the Wild Goats of the Caucasus, in which he pointed out the distinctions between *Capra caucasica* and *C. pallasi*, which had been until recently confounded together.—Mr. G. Boulenger made remarks on the skull and cervical vertebrae of *Meiolania*, Owen (*Ceratochelys*, Huxley), and expressed the opinion that these remains indicated a Pleurodiran Chelonian of terrestrial and herbivorous habits. The peculiar structure of the tail pointed to a distinct family (*Meiolaniidae*).—A second paper by Mr. Boulenger contained remarks on a rare American fresh-water Tortoise, *Emys blandingii*, Holbrook, which was shown to be a close ally of *Emys orbicularis* of European fresh waters, but to present distinct differential characters.—Mr. A. Dendy read a paper on the West Indian Sponges of the family Cheliniæ, and gave descriptions of some new species.—Mr. H. Seeböhm gave the description of a new species of Thrush, from Southern Brazil, proposed to be called *Merula subalaris*.—A communication was read from Mr. R. Bowdler Sharpe, containing the description of a new species of the genus *Chalyptomena*, lately discovered by Mr. John Whitehead on the mountain of Kina-Balu, in Borneo, which he proposed to name *C. whiteheadi*.

PARIS.

Academy of Sciences, July 4.—M. Janssen in the chair.—Inauguration of the statue to Nicolas Leblanc, by M. Eug. Peligot. It was stated that this bronze statue, erected to the memory of the illustrious chemist, inventor of artificial soda, was unveiled on June 28 in the court of the Conservatoire des Arts et Métiers.—Note accompanying the presentation of the Report of the English Commission appointed to inquire into M. Pasteur's treatment of rabies, by M. Pasteur. While expressing his great satisfaction at the general tenor and conclusions of this Report, the author referred in feeling terms to the premature death of his distinguished fellow-worker, M. Vulpian, who had not lived to receive this high testimony to the efficacy of the method of cure in which he had taken so much interest.—Note on the first labours of the Observatory of Nice, by M. Faye. After passing in rapid review the services already rendered to science during the construction of the works at this important astronomical station, the author stated that these works are now completed by the erection of the great 0.76 m. telescope, constructed by the brothers Henry, and mounted in Eiffel's wonderful revolving dome, whose diameter exceeds that of the Pantheon at Rome. He added that the International

Geodetic Association has decided to hold the next session of its Permanent Commission in October of this year at the Observatory of Nice.—General method for determining the constant of aberration, by M. Lœwy. In this concluding paper the particular process is described by means of which the research may be made independent of the errors due to the action of the screw in the apparatus already described.—On some double phosphates of thorium and sodium, or of zirconium and sodium, by MM. L. Troost and L. Ouvrard. After examining the action of the metaphosphate, of the pyrophosphate, and orthophosphate of potassa on thorine, zircon, and their salts, the authors here describe the action of the meta-, pyro-, and orthophosphate of soda under analogous conditions. From the study of the double phosphates formed by these bases with soda and phosphoric acid, they are unable to derive any argument in support of the theory that has been advanced on the relation of zircon to thorine in order to justify the formula of a bioxide given to the latter substance. In a future communication the reactions will be described which separate both of these compounds from each other, and bring thorine more into relationship with the protoxides.—Remarks accompanying the presentation of two works on subterranean waters in the present and former geological epochs, by M. Daubrée. In the first of these works, relating to the present epoch, the author describes the manifold action of water in its passage through the rock on the constitution of the terrestrial crust. The underground waters are studied from the several stand-points of their régime, their temperature, and their composition. The second work, dealing with past epochs, studies the action of these waters in modifying the original substance of the crust of the earth, and especially in connexion with the distribution of minerals. It is shown generally that the superheated water, whose presence is betrayed by thermal springs and igneous exhalations, slowly and silently brings about great and permanent effects in the interior of the globe, at all times giving rise to mineral deposits of all kinds. By its incessant subterranean circulation, and especially by its chemical work, it accomplishes a sort of vital action, which is perpetuated from age to age.—On an atlas of marine meteorology presented to the Academy by M. Mascart. A limited number of copies of this work have been issued by the Central Meteorological Bureau in connexion with the Exhibition at Havre, and at the expense of a person who desires to remain anonymous. It has been prepared by M. Léon Teisserenc de Bort, and comprises thirty-two charts based on the best published and unedited materials. The first series deals with the mean distribution of pressure, and of the prevailing winds during the different seasons on the surface of the globe. The second is more especially devoted to the study of the Atlantic Ocean, indicating the atmospheric systems, the temperature of the sea, the position of the Arctic and Antarctic floating ice, the line of equal declination, &c. According to the donor's intention the work will be distributed gratuitously to all captains of the mercantile marine who have by their personal observations contributed in any way to the progress of meteorological studies.—Fluorescences of manganese and bismuth (continued), by M. Lecoq de Boisbaudran. In this paper the author deals (1) with two solid solvents, one of which, in the presence of the other, plays the part of a moderately active body, and an active substance fluorescing energetically with one only of these solvents; (2) with two solid solvents, the first of which (α) plays the part of a moderately active body and two active substances fluorescing energetically, one with the two solvents α and β , the other with β alone.—Elements and ephemeris of the planet 267, by M. Charlois. These elements have been calculated by three equatorial observations made at the Observatory of Nice on May 27 and June 9 and 27, 1887. At the instant of opposition on June 5 the planet was of magnitude 13.5—On the position of the foci in a tangential bundle of plane curves, by M. G. Humbert. From various considerations deduced from Leguerre's theorem, the author arrives at the general proposition that the poles of any three series are the foci of three algebraic curves of the same class, belonging to the same tangential bundle; inversely the real foci at a finite distance from a curve of this bundle constitute a system of poles.—On the synthesis of pilocarpine, by MM. Hardy and Calmels. The synthesis of this substance has been obtained by means of β -pyridino α -lactic acid. It takes place in two phases: (1) transformation of this acid into pilocarpidine; (2) transformation of pilocarpidine into pilocarpine.—On the origin of the striated Bilobites, by M. Ed. Bureau. These tracings, occurring on certain sandstones, are referred to the footprints of some

Crustacean of the order of Phyllopod, which cannot at present be more accurately determined.—Observations on the meteor of June 17, 1887, by MM. Waltner and Didier. This meteor, seen at an altitude of about 45° above the horizon near the Mont-Parnasse railway-station at 7.45 p.m., was especially remarkable for its extraordinary brilliancy. It disappeared in about five seconds, without any noise or explosion, before reaching the top of the houses.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Matter and Energy (Kegan Paul).—My Microscope: by a Quekett Club Man (Roper and Drowley).—Exercises in Practical Chemistry, vol. i. 4th edition: Harcourt and Madan (Clarendon Press).—Bibliographie Générale de Astronomie, vol. i.: Houzeau and Lancaster (Hayez, Brussels).—Four-Figure Mathematical Tables: J. T. Bottomley (Macmillan).—Handbook of Fern Allies: J. G. Baker (Bell).—Jahrbuch der Meteorologischen Beobachtungen der Wetterwarte der Magdeburgischen Zeitung, Jahrgang iv., 1885 (Magdeburg).—Actes de la Société Helvétique des Sciences Naturelles; Comptes Rendu, 1885-86 (Genève).—Compte Rendu des Travaux de la Société Helvétique des Sciences Naturelles, 1886 (Genève).—Mittheilungen der Naturforschenden Gesellschaft in Bern ans dem Jahr 1886 (Bern).—Foods and Food Adulterations: part 1, Dairy Products (Washington).—Journal of Anatomy and Physiology, July (Williams and Norgate).—Mind, July (Williams and Norgate).—Journal of the Society of Telegraph-Engineers and Electricians, No. 67, vol. xvi. (Spon).—Folk-Lore Journal, vol. v. part 3 (Stock).—Zeitschrift für wissenschaftliche Zoologie, xiv. Band, 3 Heft (Engelmann, Leipzig).—Botanische Jahrbücher für Systematik, Pflanzen-geschichte, und Pflanzengeographie, Achter Band, v. Heft (Engelmann, Leipzig).—The Indian Forester, April, May, and June 1887 (Roorkee).

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