Mr. H. H. West read a paper on the Riveting of Iron Ships, giving tables for calculating the plate and rivet area for double-riveting, treble-riveting, and quadruple-riveting. He referred to the researches of Sir Edward Reed, the Institution of Mechanical Engineers, and others, but did not mention the modification of treble-riveting proposed some years ago, and lately carried into effect by a firm in Holland. On this system, in the middle row of the three rows of rivets, the rivets are spaced only half the distance apart of the two outer rows, the result being to increase very largely the proportion of strength. Capt. Heathorn described an arrangement called by him a Water-brake, for stopping the way of a ship in cases of collision or otherwise; and finally, Mr. J. E. Liardet described an apparatus for indicating the position of a ship's helm.

On the whole the Institution is to be congratulated on the interest and importance of the papers provided for it, and still more on the vigour and ability with which they were discussed by the very eminent engineers and shipbuilders who thronged the rooms of the Society of Arts for the purpose.

SCIENTIFIC SERIALS

Bulletin de l'Académie R. de Belgique, January 5.—On the existence of a fourth species (*B. borealis*) of the genus Balænoptera in the North Atlantic and Arctic Oceans, by M. Guldberg.—On the action of chlorine on combinations of sulphur, and on organic oxysulphurets, third communication, by M. W. Spring.—Researches on spermatogenesis in the Selacians (*Scyllium catulus, Sc. canicula, Raja clavata*), the salamander and mammals, by Prof. A. Swaen.—Essays on the political history of the last three centuries, by M. Van Praet.—Biographical notice of the painter Michael Van Cocxyen of Mechlin, by M. Castan.

Atti della R. Accademia dei Lincei, January 20.—Letter from King Humbert announcing an additional annual grant of 400*l.* for the promotion of biological studies, to be distributed in prizes in any way the Academy may think fit.—Some philological remarks on the 104th Psalm, by Guidi Ignazio.—Notice of an unpublished work of Prince Federico Cesi, entitled "De Laserpiteo et Laserpitii pluvia," in the library of the Botanic Institute at Padua, by Prof. A. Favaro.—Note on the antiquities discovered at Ventimiglia, Montefiascone, Naples, Pompeii, and other parts of Italy during the month of December 1883, by S. Fiorelli.

February 3 and 4.—Notice of some unpublished writings of Galileo Galilei in the National Library of Florence, by Prof. Favaro.—Report on Prof. Bellonci's work "On the Segmentation of the Egg of the Axolotl," by S. Trinchese.—Report on Dr. G. Frattini's work "On Some Propositions in the Theory of Substitutions," by S. Battaglini.—Report on Dr. L. Macchiati's work on the chemical nature of chlorophyll, by S. Cannizzaro.—Observations of the solar spots and faculæ made at the Observatory of the Collegio Romano during the year 1883, by Pietro Tacchini.—On the temperature corresponding to the Glacial period, third note, by Pietro Blaserna.—On the extraordinary crepuscular phenomena observed during the last few months, by Lorenzo Respighi.—Contributions to the study of the carbopyrolic acid α, by G. L. Ciamician and Paolo Silber.—Remarks on the Veronese Chelonian (*Protosphargis veronensis*) discovered in 1852 in the Upper Chalk near St. Anna di Alfaedo in Valpolicella, by Giovanni Capellini.—Geological observations on the islands of the Tuscan Archipelago, by B. Lotti.—Reports on the competition for the Royal Prizes for Physics, History, and Geography for the year 1882, by Signors Cantoni and Villari.—Reports on the Ministerial prizes for the Philosophical, Social, and Natural Sciences for the year 1883, by Signors Bonatelli and Trinchese.

February 17.—Obituary notices of the late Pietro Canal and Edoardo Laboulaye, Members of the Academy, by the President.—On the practice of burying human bones stripped of the flesh in Neolithic times, by Luigi Pigorini.—Note on the antiquities discovered at Felonica, Este, Imola, and in other parts of Italy during the month of January 1884.—Remarks on some codices in the Angelica Library connected with patristic theology, by Enrico Narducci.—Note on the parabolic orbit of the comet (*e*) discovered by Hartwig at Strasburg on August 24, 1879, by E. Millosevich.—On a remarkable disposition of the isogonic lines of terrestrial magnetism observed in the eastern districts of the Valley of the Po (two illustrations), by Ciro Chistoni.

Rivista Scientifico-Industriale, February 15 and 29.—Description of a new apparatus for the measurement of electro-motor forces (four illustrations), by E. Reynier.—Mathematical demonstration and value of the angle of least deviation described by a ray of light in its passage through a prism (one illustration), by Giuseppe Vanni.—Practical determination of the metallic resistance and chemical reaction of an electrolytic circuit, by Eugenio Marchese.—On the causes of the remarkable after-glows witnessed in Italy and elsewhere in 1883–84, by Prof. Carlo Marangoni. The author compares these phenomena with others of an analogous character observed in various parts of Europe in the year 1869. On several grounds he infers that the pink and red glows could not have been produced by moisture disseminated in the atmosphere in the solid, liquid, or gaseous state. He concludes that they are due to the presence of dust or minute particles of sand, which absorb the coloured rays in the central region of the solar spectrum while transmitting the extreme colours—that is, red and violet. The paper, which is to be continued, offers no suggestion as to the possible origin of the particles of dust to which the phenomena are attributed.—Note on the extinct and living mollusks of the Gardone district, by Prof. Strobel.—On the fossil insects of the Carboniferous schists of Commentry, by S. Brongniart.—Note on the limits of diatomaceous vegetation in marine basins, by Count A. F. Castracane.

Rendiconti del Reale Istituto Lombardo, February 21.—Biographical notice of Carlo Tenca and his times, by Prof. Giovanni Cantoni.—Some reflections on the results of the recent examinations in the Italian language and literature in the higher schools of the Peninsula, by Prof. C. Baravalle.—Fresh researches on the oxidation of sulphur, with some remarks on the oxidising power of the so-called atomic oxygen and of ozone, by Prof. E. Pollacci.—On some cases of subcutaneous nervous affections caused by the presence of Oscyuris, Tænia, Solium, and other parasites, by Prof. A. Scarenzio.—On the relations between the malady known as "bronze skin," and the changes in the suprarenal blood capsules, by Prof. G. Sangalli.—Meteorological observations made in the Brera Observatory, Milan, during the month of February 1884.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, March 27.—"On the Electro-chemical Equivalent of Silver, and on the Absolute Electromotive Force of Clark Cells." By Lord Rayleigh, D.C.L., F.R.S.

The investigations upon this subject which have been carried on by Mrs. Sidgwick and myself during the last year and a half, though not yet quite finished, are so far advanced that no doubt remains as to the general character of the results; and as these results have application in the daily work of practical electricians, it is thought desirable to communicate them without further delay.

The currents are measured by balancing the attraction and repulsion of coaxal coils against known weights, as described before the British Association in 1882, a method which has fully answered the favourable expectations then expressed. To what was said on that occasion it will be sufficient for the present to add that the readings are taken by *reversal* of the current in the fixed coils, and the difference of weights thus found (about 1 grm.) represents the double force of attraction free from errors depending upon the connections of the suspended coil, and other sources of disturbance.

The difficulties which have been experienced, and which have been the cause of so much delay, have related entirely to the behaviour of the silver voltameters, of which never less than two, and sometimes as many as five, have been included in the circuit of the measured current. In order to render the deposit more compact, and thus to diminish the danger of loss in the subsequent manipulations, *acetate* of silver was added in the earlier experiments to the standard solution of nitrate. Experience, however, has shown that the principal risk is not in the loss of metal, but in the obstinate retention of salt within the fine pores of the deposit, leading to an over-estimate of the amount. When the texture is very compact, this danger increases, and deposits from a solution containing acetate are often decidedly too heavy, even after the most careful and protracted washings. On heating to low redness a portion, at any rate, of the retained salt is decomposed NO_3 is driven off, and a loss of

weight ensues. With pure nitrate, to which we finally recurred, the risk is much less.

The actual weights of deposited silver were usually from 2 to 3 grms., and, so far as the mere weighings are concerned, should have been correct to 1/10,000. Discrepancies three or four times as great as this are, however, actually met with, whether due to retention of salt or to loss of metal it is difficult to say. The final number, expressing in C.G.S. measure the electrochemical equivalent of silver, is a little lower than that ($1\cdot119 \times 10^{-2}$) given on a previous occasion (*Cambridge Proceedings* for November 26, 1883). It approximates closely to $1\cdot118 \times 10^{-2}$, and is thus in precise agreement with the number announced within the last few weeks by Kohlrausch, viz. $1\cdot1183 \times 10^{-2}$. Its substantial correctness can therefore hardly be doubted, more especially as it does not differ very much from the number (1·124) obtained by Mascart. In terms of practical units, we may say that the ampere current deposits per hour 4·025 grms. of silver.

When we are provided with means for the absolute measurement of currents, the determination of electromotive force is a very simple matter if we assume a knowledge of absolute resistance. A galvanic cell is balanced against the known difference of potentials generated by a known current in traversing a known resistance. The difficulty relates entirely to the preparation and definition of the standard cells. A considerable number of Clark cells have been set up and tested at intervals during the last six months, and their behaviour has been satisfactory, the extreme range after the first ten days) not much exceeding 1/1000. A modified form of cell, in which the solid zinc is replaced by an amalgam, is at present under trial.

In Mr. Latimer Clark's own determination the B.A. unit is assumed to be correct, and the E.M.F. of the cell at 15° C. was found to be 1·457 volt. *On the same assumption* we obtain the not greatly differing value 1·453 volt. If we take the true value of the B.A. unit as ·9867 ohm, 1·453 will be replaced by 1·434.

Experiments are also in progress to determine in absolute measure the rotation of the plane of polarisation of light in bisulphide of carbon under the action of magnetic force. Of the results obtained by Gordon and Becquerel, differing by about 9 per cent., our preliminary measurements tend rather to confirm the former.

Mathematical Society, April 3.—Prof. Henrici, F.R.S., president, in the chair.—The Rev. A. C. E. Blomfield was admitted into the Society.—The following communications were made :—On double algebra, by Prof. Cayley, F.R.S.—On the homogeneous and other forms of equation of a plane section of a surface, by J. J. Walker, F.R.S.—A direct investigation of the complete primitive of the equation $F(x, y, z, p, q) = 0$, with a way of remembering the auxiliary system, by J. W. Russell.—On electrical oscillations and the effects produced by the motion of an electrified sphere, by J. J. Thomson.

Chemical Society, March 31.—Anniversary Meeting.—Dr. W. H. Perkin, F.R.S., president, in the chair.—The President read his annual address. The number of Fellows is at present 1324. During the past twelve months the Society has lost by death nineteen Fellows, including Sir C. W. Siemens, Messrs. W. Spottiswoode, J. T. Way, and J. Young. After briefly alluding to the more important advances in chemical science, the president drew attention to the fact that the number of original papers read before the Society had steadily decreased since 1881, notwithstanding the steady increase in the number of Fellows, and the greater facilities for the study of chemistry now offered by the numerous laboratories recently opened. The Longstaff Medal was awarded to Mr. O'Sullivan. The following Officers and Council were elected :—President : Dr. W. H. Perkin, Ph.D., F.R.S. ; Vice-Presidents : Sir F. A. Abel, Warren De La Rue, E. Frankland, J. H. Gilbert, J. H. Gladstone, A. W. Hofmann, W. Odling, Sir Lyon Playfair, H. E. Roscoe, A. W. Williamson, P. Griess, G. D. Liveing, E. Schunck, T. E. Thorpe, A. Voelcker, W. Weldon ; Secretaries : H. E. Armstrong, J. Millar Thomson ; Foreign Secretary : H. Müller ; Treasurer : W. J. Russell ; Members of Council : E. Atkinson, H. T. Brown, T. Carnelly, M. Carteighe, R. J. Friswell, W. R. E. Hodgkinson, D. Howard, F. R. Japp, R. Meldola, R. Messel, C. O'Sullivan, C. Schorlemmer.

Geological Society, March 22.—Prof. T. G. Bonney, F.R.S., president, in the chair.—The Rev. Frank Ballard, M.A., was proposed as a Fellow of the Society.—The following communications were read :—On *Rhytidosteus capensis*, Owen, a Labyrinthodont Amphibian from the Trias of the Cape of Good Hope, by Sir Richard Owen, K.C.B., F.R.S. The author first noticed the discovery of certain forms of Amphibia belonging to the genera *Labyrinthodon*, *Brachyops*, *Petrophryne*, and *Rhinosaurus*, and called attention to certain typical peculiarities in the structure of the teeth, the form of the bony palate, and the double occipital condyle. An imperfect cranium of the species now described as *Rhytidosteus capensis* was procured by Mr. Heer in the Orange Free State from the Trias of Swanopol, Beersheba, and deposited by him in the Bloemfontein Museum. This specimen, which was brought to England and submitted to the author by Dr. Exton, consists of the anterior portion of the skull with part of the mandible attached. The general form is batrachoid, and one of the hinder palato-vomerine teeth, on being examined microscopically, exhibited the characteristic labyrinthodont structure. The surface of the skull, and the characters of the premaxillary, nasal, frontal, and prefrontal bones were described. The parietals and postfrontals are imperfect, the hinder part being lost. The rami of the mandible are also imperfect behind, but a broken fragment shows the articular surface. The vomerine bones were also described, with the posterior nostril and the teeth before and behind this opening. The breadth of the bony palate at its hinder fractured border is 5 inches ; the length of the part preserved 4½ inches ; the mandible, when perfect, was probably from 11 inches to a foot in length. The author also gave an account of the dentition wielded by the premaxillary, maxillary, vomerine, palatine, and mandibular bones. The author pointed out that the type of air-breathing vertebrates to which the present genus belongs reached its highest development in the Triassic period in Britain, Russia, North America, Hindostan, and South Africa. The only known antecedent form from which the labyrinthodont structure of tooth might have been derived is a genus of fishes named *Dendrodus*, in the Old Red Sandstone. The Liassic Ichthyosaurs also show some similarity in tooth-structure ; but in them there is far greater simplicity.—On the occurrence of antelope-remains in Newer Pliocene beds in Britain, with the description of a new species, *Gazella anglica*, by E. Tulley Newton, F.G.S.—A comparative and critical revision of the Madreporaria of the White Lias of the Middle and Western Counties of England, and of those of the Conglomerate at the base of the South-Wales Lias, by Robert F. Tomes, F.G.S.

Zoological Society, April 1.—Prof. W. H. Flower, LL.D., F.R.S., president, in the chair.—Prof. Flower exhibited and made remarks on a series of skulls of the Bottle-nosed Whale (*Hyperoodon rostratus*), illustrating the various stages presented by this animal as regards the conformation of its skull in the different ages of both sexes. Prof. Flower also exhibited, on behalf of Messrs. Langton and Bicknell, a specimen of spermaceti obtained from the head of the *Hyperoodon*.—Mr. Sclater exhibited and made remarks on specimens of the eggs of two species of Testudinata (*Testudo elephantopus*, and *Chelys matamata*) recently laid by animals living in the Society's Gardens.—Mr. R. Bowdler Sharpe exhibited and made remarks on a Red-throated Pipit (*Anthus cervinus*) caught near Brighton in March last. Mr. Sharpe exhibited at the same time an example of the true Water-Pipit (*Anthus spinoletta*) captured at Lancing, in Sussex, in March 1877.—Prof. E. Ray Lankester, F.R.S., exhibited and made remarks on a large living Scorpion (*Buphus cyaneus*) from Ceylon.—A communication was read from Prof. T. Jeffrey Parker, being the first of a series of studies in New Zealand Ichthyology. The present paper gave a description of the skeleton of *Regalecus argenteus*. The species was founded on a specimen cast ashore at Moeraki, Otago, in June 1883.—A communication was read from Viscount Powerscourt, F.Z.S., containing an account of the origin and progress of the herd of Japanese Deer at Powerscourt.—A communication was read from Mr. G. A. Boulenger, giving the diagnoses of some new Reptiles and Batrachians from the Solomon Islands, collected and presented to the British Museum by Mr. H. B. Guppy, of H.M.S. *Lark*.—A communication was read from Mr. C. O. Waterhouse, containing an account of the coleopterous insects collected by Mr. H. O. Forbes in the Timor-Laut Islands.—Mr. F. D. Godman, F.R.S., read a paper containing an account of the Lepidoptera collected by the late Mr. W. A. Forbes on the banks of the Lower Niger, the Rhopalocera being described by Messrs. F. D. Godman and O. Salvin, and the Heterocera by Mr. H. Druce. The species of butterflies were fifty in number, and comprised representatives of all the families of Rhopalocera hitherto known from Tropical Africa, except the Erycinidæ, a

group but feebly developed in this region.—Mr. R. Bowdler Sharpe read the description of three rare species of Flycatchers, viz. *Alseonax minima*, *Lioptilus abyssinicus*, and *Lioptilus galinieri*. Mr. Sharpe also described an apparently new species of Nuthatch discovered by Mr. John Whitehead in the mountains of Corsica, and proposed to be called *Sitta whiteheadi*.—Mr. G. E. Dobson, F.R.S., read a paper on the myology and visceral anatomy of *Capromys melanurus*, of which rare mammal specimens had been lately obtained for him by Mr. F. W. Ramsden, H.M.'s Consul at St. Jago de Cuba. The well-known division of the hepatic lobes into minute lobules in *C. pilorides* from the same island was shown not to exist in *C. melanurus*, which otherwise closely resembled the former species, and this character could therefore no longer be considered a generic one.

EDINBURGH

Royal Society, March 3.—Sir W. Thomson, hon. vice-president, in the chair.—Sir W. Thomson communicated a paper on the efficiency of clothing for maintaining temperature. He showed that if a body be below a certain size, the effect of clothing will be to cool it. In a globular body the temperature will only be kept up if the radius be greater than $\frac{k}{2e}$, where k is the conductivity of the substance and e its emissivity.—Prof. J. Thomson read a paper on the law of inertia, the principle of chronometry, and the principle of absolute clinural rest and of absolute rotation. In this paper the author proceeded to discriminate between what men can know, and what men cannot know, as to rest and motion in unmarked space. For example, men have no means of knowing or imagining whether a ball existing in space is in motion or at rest; nor have they any means, if it be in motion, of knowing or imagining any one direction, rather than another, as being the direction of the straight line from the place that was occupied by its centre at any past instant to the place occupied by that centre at present. There is then an essential difficulty as to our forming a distinct conception either of rest or of rectilinear motion through unmarked space. He discussed, in connection with this, the statement set forth by Sir Isaac Newton, under the designation of the first law of motion, that *every body continues in its state of resting or of moving uniformly in a straight line, except in so much as, by applied forces, it is compelled to change that state.* A most important truth in the nature of things, perceived with more or less clearness, was, he said, at the root of that enunciation; but the words, whether taken by themselves, or in connection with Newton's accompanying definitions and illustrations, were inadequate to give expression to that great natural truth. He proceeded to explain the character of mutual motions, which can in any sense be regarded as uniform rectilinear mutual motions. He gave, under the title of the law of inertia, an enunciation which he offered as setting forth, by a better expression, all the truth which is either explicitly stated, or is suggested by the first and second laws of motion in Sir Isaac Newton's arrangement. In connection with the law of inertia he gave further statements bringing out expressions of the principle of chronometry and the principle of "directional fixedness" or of absolute clinural rest, and of absolute rotation.—Sir W. Thomson described a modification of Gauss's method for determining the horizontal component of terrestrial magnetic force and the magnetic moments of bar magnets in absolute measure.—Mr. Thomas Muir gave a paper on the phenomenon of greatest middle in the cycle of a class of periodic continued fractions.

March 17.—Robert Grey, vice-president, in the chair.—Messrs. Peach and Horne, of the Geological Survey of Scotland, communicated a paper on the Old Red Sandstone volcanic rocks of Shetland.—Mr. P. Geddes gave the first two parts, mathematical and physical, of a paper on the principles of economics.—Prof. Crum Brown communicated a paper by Prof. Michie Smith on an integrating hygrometer.

DUBLIN

University Experimental Science Association, March 18.—On the boiling-points of the haloid ethers, by F. Trouton.—On a new test for gallic acid, by A. E. Dixon, B.A. The crimson-red colour which Dr. Sidney Young had noticed on adding a solution of cyanide of potassium to a solution of gallic acid, and which a few minutes' rest or gentle warmth causes completely to disappear, is probably due to oxidation. For although when shaken in contact with the air the colour reappears, it will not do so when shaken in an atmosphere of hydrogen, nitrogen, or carbon dioxide. On re-exposure to the air, with agitation, the colour may be brought back. The red colour is not dissolved out by alcohol, ether, or chloroform; neither does it afford any characteristic absorption-spectrum.—On Ayrton and Perry's electrometers, by G. F. Fitzgerald, F.R.S.—An electro-magnet for use in analysis was exhibited by J. Joly, B.E. The electro-magnet is sealed into a test-tube to enable it to be dipped into solutions containing perruginous particles.

PARIS

Academy of Sciences, March 31.—M. Rolland in the chair.—Remarks on the third volume of the "Annals of the Bureau of Longitudes," presented to the Academy by M. Faye.—On a proposed classification of comets according to their direct or retrograde motion, by M. Faye.—Note on the form of the nucleus of the Pons-Brooks comet, by M. Faye.—On the specific heat of gaseous elements at very high temperatures, by MM. Berthelot and Vieille.—Note on the origin of sugar of milk, by M. Paul Bert. From experiments made on goats the author infers that the sugar of milk is produced by the mammary secretion of the superabundant sugar formed by the organisms after parturition, most probably in the liver.—On a new species of fossil Sirenian found in the Paris Basin, by M. A. Gaudry.—On the correspondence between two different species of functions of two systems of quantities correlated and equal in number, by M. Sylvester.—Separation of gallium; separation from organic substances, by M. Lecoq de Boisbaudran.—On a modified form of lightning-conductor, by M. A. Callaud.—Results of experiments with a new ventilating system worked by centrifugal force, by M. L. Ser.—Observations made at the Meudon Observatory on the planet Mars, by M. E. L. Trouvelot.—Approximate calculation of the thrust and surface of fracture in a homogeneous horizontal mass of earth supported by a vertical wall, by M. J. Boussinesq.—On Gyldén's differential equation:—

$$\frac{d^2x}{dt^2} = \phi_0 + x\phi_1 + x^2\phi_2 + \ldots + x^m\phi_m + \ldots$$

in which the ϕ's are trigonometrical series, by M. Poincaré.—Distribution of the potential in a rectangular plate traversed by an electric current with permanent *régime*, by M. A. Chervet.—On the electric phenomenon of the transport of ions and its relation to the conductivity of saline solutions, by M. E. Bouty.—On the resistance of the carbons employed in the electric light of the French lighthouses, by M. F. Lucas.—Note on the verification of the laws of transverse vibration in elastic rods, by M. E. Mercadier.—The general theory of dissociation deduced from the general data furnished by the mechanical theory of heat, by M. Isambert.—Note on the measurement of the tension of dissociation in the iodide of mercury, by M. L. Troost.—On the phenomenon of the crystalline superheating of sulphur, by M. D. Gernez.—On the non-existence of the hydrate of ammonium, by M. D. Tommasi. The author's experiments lead him to the conclusion already arrived at by Thomsen, that hydrate of ammonium does not exist in ammoniac water.—On the decomposition by water of the combinations of cupreous chloride with the chloride of potassium and chlorhydric acid, by M. H. Le Chatelier.—On the composition of pitch-blende, by M. Blomstrand. From his analysis the author concludes that this substance is a mixture of uranine, silicates, carbonate of lime, and sulphuret of iron, its formula being:—

$$2U_7Pb(O_6U_5) + 5(R_2O_4Si, 2Aq) + 7(CaO_2CO) + \tfrac{1}{5}\,Fe_7S_8.$$

—Note on the quantitative analysis of the phosphoric acid in arable lands, by M. G. Lechartier.—Heat of formation of the fluoride of silver, of magnesium, and of lead, by M. Guntz.—Thermochemical study of hydrofluosiliceous acid, by M. Ch. Truchot.—On the glyoxalbisulphide of soda, by M. de Forcrand.—On the influence of cerebral lesions on the temperature of the body, by M. Ch. Richet.—On the special distribution of the motor roots of the brachial plexus in the human system, by MM. Forgue and Lannegrace.—Description of a gigantic Dictyoneura (*D. monyi*) found in the Carboniferous measures of Commentry (Allier), by M. Ch. Brongniart. This remarkable insect must have been at least fifty centimetres long.—On the origin of the roots in the ferns, by M. Lachmann.—On the causes which may modify the effects of the action of light in directing the motion of plants, by M. E. Mer.—On the diffusion of christianite in the ancient lavas of the Puy-de-Dôme and the Loire Basin, by M. F. Gonnard.—Note on the origin of certain phosphates of lime found in mass in the limestones of the Secondary series, and of

certain iron ores belonging to the class of globular ores, by M. Dieulafait.—On the solar halos observed at Saint Maur on the morning of March 29, by M. E. Renou.—Note on the presence of manganese in the wines of Grave, by M. E. J. Maumené.

BERLIN

Physical Society, March 7.—Prof. Neesen, by means of different glass tubes, demonstrated certain phenomena of Kundt's dust figures produced by experimenting with deep tones. Busied with an examination into the cause, not yet explained, of the transverse ridgings in sounding-tubes, Prof. Neesen has, instead of the high tones of longitudinally-vibrating tubes, tested deeper tones, which are kept up in the column of air of the glass tubes by an electric tuning-fork. In the course of this investigation he made very beautiful observations in many tubes of dust-whirls roaming hither and thither, now to one side, now to the other. In other tubes, again, these whirls came to light either with great difficulty or but imperfectly. It would therefore appear that the material of the tubular wall exercised some influence on the production of those whirls. The speaker had yet, however, come to no definite result respecting the cause of the transverse ridges.—Dr. Kœnig supplemented the experiments he communicated at the last sitting of the Society, on the sensitiveness of normal eyes for variations of colour between the wave-lengths of 640 and 430. This he had so far done, inasmuch as he had tested the influence of light-intensity on the sensibility in question. Seeing, as was well known, that light-intensity, in this part of the spectrum especially, mounted very rapidly from the line C to the line D, and again sank from the maximum beyond D down to F, it would be possible that the differentiating sensibility arrived at in the former experiments was in large part conditioned by the differences of intensity. The cooperation of intensity was now in the new experiments partly excluded as a factor in this way, that the spectrum was observed through an absorbing medium whose maximum of absorption stood at D, so that the curve of light-intensity between C and D rose with much less rapidity, ran horizontally for some distance, and then sank to D. The measurements, being carried out as in the former experiments, yielded the result that the differentiative sensibility under the conditions mentioned had undergone very little alteration, and that, consequently, light-intensity had no influence on the range that had been arrived at.—Prof. von Helmholtz reported on a theoretic treatise he had laid before the Berlin Royal Academy, in which he had taken in hand the task of explaining, in accordance with mechanical principles, thermal movements, and more particularly Carnot's law. He attained his object by means of the rules bearing on stationary movements, as they were calculated for a vortex revolving without friction and with great velocity, or for a fluid moving without friction in a closed circular canal. The equations for these stationary movements derived from mechanics corresponded with those derived from Lagrange's law for thermal movements.

Physiological Society, March 14.—Prof. Lucae gave an address on the subject of subjective auricular sensations and their treatment. He showed by examples that the idea that subjective auricular sensations, and in particular the generally known one of singing in the ears, had a somatic cause, such as stoppage of the external acoustic duct or of the Eustachian tube, was not in accordance with experience. Both on himself and on persons of musical culture he had determined the pitch of the singing or whistling sound, and had found it equal to the proper tone of the external acoustic duct. This circumstance, together with several other facts, led him to the conjecture that the singing in the ears was caused by a tetanus of the tensor tympani, which set the air over the membrane of the tympanum in continuous oscillation. In cases of suffering from this distemper, of which the speaker cited a number of examples, the subjective auricular sensations were to be divided into such as were intensified and such as were abated by external sounds. Both kinds were to be regarded as phenomena of abnormal resonance, and were accompanied by different degrees of hardness of hearing down to deafness. The treatment of these subjective sensations, so far as they were simple tones and noises, and not the subjective hearing of words or of anything outside the hearer (disturbances psychological and beyond the scope of his address) consisted, in the opinion of the speaker, an opinion based on manifold personal experience, in subjecting the sufferers, for progressively longer periods of time, and for as many as two to three minutes at once, to a certain constant tone of the tuning-fork. In such a case Prof. Lucae used deep tuning-forks with such as heard subjective high tones, and *vice versâ*. With the cessation of the subjective noises the deafness also usually disappeared, and the sufferers recovered a permanently normal state in this respect. An explanation of this phenomenon the speaker thought might be found in the analogy of other sensations in which abnormal excitement in one part of the sensory nerves was relieved by the excitement of neighbouring nervous parts.—Prof. Munk reported on a treatise sent for insertion in the *Verhandlungen* by Dr. Gad, a foreign member. Contrary to the opinion on the subject hitherto entertained, Dr. Gad in this treatise proved that in the spinal marrow of frogs, even under the seventh nerve-root, there were reflex centres in operation. By cutting through the spinal marrow, below this spot, reflex convulsions from the toes upwards are produced, not only on the same but also on the opposite side. In other experiments on frogs the spinal marrow was cut through beneath the medulla oblongata, and the upper part of the spinal marrow as far as the second vertebra carefully prepared and laid on filtering paper saturated with strychnine. On stimulating the frog at the lower extremities reflex movements were seen to pervade the whole body, but in the region of those sections of the spinal marrow treated with strychnine, flexor spasms were observed, though it is well known to be a special characteristic of the strychnine spasm that it exclusively attacks the extensor muscles. In this way was demonstrated the existence of conducting tracks rising from the reflex centres situated in the lowermost part of the spinal marrow up to its topmost parts. If these latter, again, were electrically stimulated, no flexor movement could be started from the spot which before, under the operation of strychnine, had generated exterior reflections. Between this part of the spinal marrow and the motory nerves there must therefore lie ganglia.—Following up his communication at the last sitting, on the presence of nitric acid in urine, Dr. Weyl brought before the Society a series of chemical reactions tending to demonstrate that nitric acid could exist and be substantiated in an oxidised solution along with urea.

CONTENTS