Mr. J. T. Barber of Spondon, Derby, informs us that on April 6, the night of the above observation at the Collegio Romano, he considered that the total impression given by the comet's light was about equal to that of a star of the seventh magnitude. If we take the theoretical intensity of light (represented by the reciprocal of the product of the squares of the distances of the comet from the earth and sun) as *unity*, we find the intensity on the following dates :—

May 12 ...	7·1	May 20 ...	11·8	May 28	24·2
16 ...	9·1	24 ...	16·0	June 10 (perihelion)	1590·0

THE SOLAR ECLIPSE OF MAY 16.—The *Nautical Almanac* gives the following particulars of this phenomenon, which is seen as a small partial eclipse in these islands :—

	Begins.	Greatest phase.	Ends.	Magnitude (sun's diameter=1).	Angle from N. point of first contact. *Direct.*
	h. m.	h. m.	h. m.		°
Greenwich	18 10·5	18 46·0	19 23·0	0·186	158
Cambridge	18 13·2	18 47·7	19 23·7	0·175	159
Oxford ...	18 7·2	18 41·2	19 16·7	0·173	160
Liverpool	18 6·2	18 36·7	19 8·4	0·139	163
Edinburgh	18 13·2	18 40·2	19 8·1	0·105	167
Dublin ...	17 55·2	18 22·9	18 51·5	0·116	166

If we apply the Littröu-Woolhouse method of distributing the times approximately over this country we have the following equations :—

G.M.T. of	h.	m.
Beginning	18	6·12+[0·4696] L−[9·2403] M.
Greatest phase	18	43·58+[0·2142] L+[8·5528] M.
Ending	19	22·58+[9·4197] L+[9·4134] M.

The magnitude is given by 0·205−[8·115] L+[7·250] M.

Here the latitude of the place for which the Greenwich times are required is put $=50°+L$ (and expressed in degrees and decimals), and M is the longitude from Greenwich, taken positively towards the east, and expressed in minutes and decimals of time.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

OXFORD.—Prof. Odling will conclude this term his course on the Atomic Theory; Mr. Fisher will lecture on Inorganic Chemistry; and Mr. F. J. Brown will form a class for practical instruction in organic chemistry.

Prof. Lawson will lecture at the Botanic Gardens on the General Morphology of Plants, and will continue his course on the Elements of Systematic Botany.

Mr. Yule will give a course of demonstrations at the Magdalen College Laboratory, on the Physiology of the Nervous System.

A Postmastership in Physical Science is offered by Merton College in June. The examination will be held in common with Magdalen and Jesus Colleges. The Postmastership is of the annual value of 80*l.*, and is tenable for five years from election, provided that the holder does not accept or retain any appointment incompatible with the pursuance of the full course of University studies. After two years' residence the College may raise, by a sum not exceeding 20*l.* per annum, the Postmastership of such Postmasters as shall be recommended by the Tutors for their character, industry, and ability.

Candidates for the Postmastership, if members of the University, must not have exceeded six terms of University standing, but there is no limit of age.

MR. J. PERRY, M.E., has been elected to the Chair of Mechanical Engineering at the City and Guilds Technical College, Finsbury, at the open election this week.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, March 30.—"On the Movement of Gas in 'Vacuum Discharges.'" By William Spottiswoode, F.R.S., and J. Fletcher Moulton, F.R.S.

In the preparation of tubes for our experiments, it was often noticed, that after the exhaustion had been carried to a certain degree, the passage of a strong current had the effect of increasing the pressure. This appeared to be due to an expulsion of gas from the terminals themselves by the passage of the discharge. And accordingly the use of such currents from time to time during the process of exhaustion was adopted for making the vacuum more perfect and more permanent than otherwise would have been the case. On the other hand, it was also noticed, that after the tube had been taken off the pump and sealed in the usual way, the passage of a strong current had in some instances the effect of decreasing the pressure. We thus met with two effects, apparently due to the same cause, but diametrically opposite in character.

Matters remained in this rather confused state, until we observed, with more care than before, a tube of which the exhaustion was near the phosphorescent state, and of which both terminals were metallic cones, and consequently presented large surfaces for any action which might take place upon them.

In what may be considered to have been its normal condition, this tube showed three or four large white striæ with a dark space of considerable size round the negative terminal. On passing the discharge through the tube for some minutes, the dark space increased, the striæ became fewer and feebler in illumination, the green phosphorescence began to show itself, and the discharge showed the usual signs of reduced pressure. On suddenly reversing the current, the striæ became again more numerous and more brightly illuminated, precisely as they would be by an increase of pressure, while the other features of the discharge in a great measure resumed their original character.

The most probable explanation of these phenomena appears to be this, that the effect of the discharge is actually to alter the pressure in the tube, not by any modification in the chemical composition of the gas, but simply by driving occluded gas out of one terminal, and by drawing it in, or occluding it, at the other. On reversing the discharge, the operation is reversed, and the occluded contents of one terminal are thrown along the tube to be occluded at the other. This view of the mechanism whereby the observed phenomena are produced is supported by the absence of these appearances when the terminals are comparatively small and the pressure is such that the occluded contents of the metallic mass forming one terminal would form only a small fraction of the total mass of gas in the tube; for in that case the pressure, and consequently the appearance of the discharge, would be affected only in an inappreciable degree by the injection of the contents of the terminal. It should also be added that, when the terminals are of unequal size, the effects are unequal, as might have been expected.

The phenomena in question appears to have so important a bearing on the mechanism of the discharge itself that it becomes a question of great interest to determine whether the missing gas is to be found in either of the terminals; and, if so, whether the ejection takes place at the positive, and the occlusion at the negative terminal, or *vice versâ*. For this purpose, I have devised a tube with three terminals, but have not yet had time to complete its construction or to make the experiment.

Zoological Society, April 4.—Prof. W. H. Flower, LL.D., F.R.S., president, in the chair.—Mr. Sclater exhibited and made remarks on an example of a rare Flycatcher (*Cyanomyias cœlestis*) from the Philippines, which had been sent to England for determination by Dr. Moesch of Zurich.—Mr. Sclater also exhibited and made remarks on two specimens of the Subcylindrical Hornbill (*Buceros subcylindricus*), which had been formerly living in the Society's Gardens.—Dr. A. Günther read the description of a new species of freshwater Turtle from Siam, a specimen of which had been recently acquired by the British Museum. The author proposed to name it *Geoemyda impressa*, from the peculiar shape of the principal upper plates, which are not merely flattened, but distinctly concave.—Mr. W. A. Forbes read a paper on the structure of the convoluted trachea of two species of Manucode (*Manucodia atra* and *Phonygama gouldi*), and added remarks on similar conformations in the tracheæ of other birds.—Mr. J. E. Harting read a paper on the eggs of three species of wading-birds which had been obtained by the Rev. W. Deans Cowan in the neighbourhood of Fianarantosa in the Betsileo country, Madagascar. The species to which these eggs belonged were *Glareola ocularis*, *Ægialitis geoffroyi*, and *Gallinago macrodactyla*. Much interest attached to these eggs, as not having been previously described.—A communication was read from Mr. E. P. Ramsay, C.M.Z.S., containing the description of a supposed new species of *Tephras*, an example of which had been obtained by the late Mr. S. White while collecting at the Aru Islands. The author proposed to name it *Tephras whitei*, after its discoverer.

Chemical Society, April 6.—Dr. Gilbert, president, in the chair.—The following papers were read:—On the action of acetyl chloride on fumaric acid, by W. H. Perkin. The author criticises the statements of Auschütz, and considers that the views of that chemist as to the above reaction are unsatisfactory. Probably the acetyl chloride removes a molecule of water from the fumaric acid yielding maleic anhydride.—Some arguments in favour of the prism formula of benzene, by U. K. Dutt.—On a convenient apparatus for the liquefaction of ammonia, by J. Emerson Reynolds. This essentially consists of a stout iron U-tube, into one leg of which is cemented a stout glass tube, containing dry ammonia gas; the other leg of the U, which is closed by an iron cap, contains some strong solution of ammonia. The intermediate space is filled with mercury. On heating the solution, pressure is produced, sufficient to liquefy the gas.—On the transformation of urea into cyanamide, by H. J. H. Fenton. On gently heating urea with metallic sodium, a violent reaction ensues; hydrogen is evolved, and a body, having the composition and all the properties of cyanamide, is formed.—On the action of haloid acids upon hydrocyanic acid, by L. Claisen and F. E. Matthews. A crystalline substance, having the formula $2HCN+3HCl$, is obtained. By the action of alcohol on this body, the hydrochloride of the base, $HCNHNH_2$, was prepared.

Royal Horticultural Society, April 11.—Dr. M. T. Masters in the chair.—*Rhododendrons:* Mr. Mangles and Hon. and Rev. Mr. Boscawen exhibited species, seedlings, and hybrids of which the following were specially worthy of note:—*R. Forsterianum*—between *R. Edgeworthii* (male) and *R. Veitchianum* (female), raised by M. Otto Forster, of Lehenhof, Austria. It is a beautiful combination of both parent forms, being very large and fragrant. It appears to be quite barren. Hybrid between *R. campylocarpum* (yellow, male) and a crimson hybrid (female). The flowers are pendulous. The yellow tint of the male has nearly gone, but the characters of the flowers are retained. It is pink when first opening, but almost white finally. This hybrid has good pollen, and bears seed.—Hybrid between *R. Thomsoni* and *R. Fortunei*. It is peculiar in having far more flowers in the truss than either parent. It is apparently fertile, and has an abundance of good pollen.—Hybrid between *R. argenteum* and *R. ponticum*. The flower is very inferior to that of the male, which bears large, well-shaped white flowers, being small, tubular, and pink, with aborted anthers. The colour of ponticum being prepotent.—*Hyacinth blossoming underground:* Mr. A. H. Smee, of Wellington, sent a specimen which, in consequence of being under a stone, had blossomed six inches below the surface. The leaves were white, but the flowers a deep purple.—*Plants exhibited: Teleopea speciosissima.* Mr. Green, gardener to Sir G. Macleay, exhibited a splendid truss of scarlet flowers and bracts of this proteaceous genus from Sydney, where it is a common shrub, but produces much less fine blossoms there than the specimen exhibited. It was first figured in the *Bot. Mag.* in 1808. He also exhibited a fine specimen of the monkey orchis, from Italy.

EDINBURGH

Royal Society, April 3.—Prof. Balfour, vice-president, in the chair.—Sir William Thomson read a paper on the conditions of stable equilibrium of a rotating mass of gravitating liquid. Laplace had proved that a given moment of momentum in a given mass of fluid of oblate spheroidal form, such as had been shown to be a form of equilibrium by Newton and Maclausin, required for equilibrium a unique value of the excentricity. Jacobi had extended the theorem to the case of an ellipsoid rotating round the shortest of its three unequal axes. By considering the Jacobian ellipsoid which differed infinitely little from a spheroid of revolution, Sir William found a certain value for the moment of momentum such that the equilibrium of the spheroid would be stable if, and only if, its moment of momentum were not greater than this critical value. The conditions under which a disc-shaped ellipsoid would split up into two distinct masses, and the limiting values of the excentricities in the Jacobian figure consistent with stability, were also discussed.—Prof. Tait communicated a note by Prof. C. Michie Smith on atmospheric electricity, which the author had found to be strongly negative on the Suez Canal and in Madras, on occasions when other evident atmospheric conditions would have led one to expect strong positive electrification.—Prof. Chrystal communicated an interesting paper by Mr. A. Jamieson, on recent tests of Swan's lamp for fall of resistance with increase of electromotive force, and ratio of candle-power to work expended. Curves and tables of numbers were shown, giving the relations between these quantities for all the forms of incandescent lamps now in use. The resistance of the lamps when heated was measured by shunting the current through a high resistance galvanometer—Sir W. Thomson's potential galvanometer. The energy expended in keeping the lamps incandescent was estimated, and the results obtained with the incandescent lamps compared with those obtained by other investigators with the arc light.—Dr. A. P. Aitken communicated the results of preliminary observations made by the Committee appointed by the Highland and Agricultural Society to investigate the nature and causes of the two sheep diseases, "Loupingill" and "Braxy." Regarding the former a great variety of opinion existed as to its cause—inclement weather, bad herding, the presence of ergot in the pasture, ticks, &c., being all assigned as possible causes. The committee had concluded, however, that these were merely aggravations, and that the disease was probably due to the presence of an organism located in the cerebro-spinal fluid. The investigations into the nature of Braxy were just begun; but in the coming autumn the committee hoped to continue the inquiry.—Prof. Tait, in the first of three short notes, pointed out the origin of the difficulty of measuring beknottedness electromagnetically. He traced it to the fact that every knot may be looked upon as consisting of separate loops, which may be linked or laced together. When there is linking there is electromagnetic work; when there is lacing, none. In the second he showed that the form of Saturn's shadow on a plane as seen from the earth could be calculated by the same process as that employed for the image of a circle produced by a thin prism; and also, how to determine from the *observed* appearance of the shadow the form of the meridional section of the rings supposed to be surfaces of revolution. Finally he pointed out the analogy between Action in particle-dynamics and Velocity-potential in hydro-kinetics.

PARIS

Academy of Sciences, April 8.—M. Jamin in the chair.—The following papers were read:—On the elliptic integral of the third species, by M. Hermite.—Note on the principle of a new photographic revolver, by M. Janssen. In the old instrument the plate is stopped each time an image is taken; in the new, it and the screen with slit have each a continuous rotatory motion. The magnitude and relation of these motions determine the rapidity of succession of the images and the conditions of their formation. The method proved successful with solar granulations. Images may be had at intervals of less than $\frac{1}{10}$ second; thus an insect's flight might be photographed.—Haloid salts of silver and potassium, by M. Berthelot.—On the union of free hydrogen with ethylene, by the same.—On the specific heat of hyponitric acid, by MM. Berthelot and Ogier.—On a thesis of meteorology recently maintained before the Paris Faculty of Sciences, by M. Faye. In this thesis, on the fœhn and the sirocco, M. Hébert has recourse to the theory of descending vortical movements, and M. Faye regards this as a step in advance. Progress would be accelerated (he urges) by giving meteorology a place in the Faculties.—On some types of plants recently observed in the fossil state, by M. de Saporta. These plants are from the Permian of the Oural region, and the Cretaceous of the Fuveau valley (Bouches-du-Rhône).—M. Bert was elected Member in Medicine and Surgery, in room of the late M. Bouillaud.—Researches on the passage of electricity through rarefied air, by M. Edlund. He has proved experimentally that the principal obstacle met by the current at the surface of passage between the electrodes and the rarefied gas, is due to an electromotive force giving an opposite current; which force, beyond a certain limit of rarefaction, continuously increases.—On a class of unicursal curves, by M. Darboux.—On hypercycles, by M. Laguerre.—On uniform doubly periodic functions, with essential singular points, by M. Appell.—On the theory of uniform functions of a variable, by M. Mittag-Leffler.—General relation between any seven points of a conic section; conic of homology; properties common to three homographic figures, by M. Parry.—Study of solar apparatus, by M. Crova. This gives results of a year's experiments by a Government Commission at Montpellier with a solar mirror and boiler; (similar experiments have been made at Constantine). The maxima of yield generally correspond to the minima of intensity of radiations. The absolute quantity of heat utilised depends essentially on the temperature of the air. In our climates it is not possible to reach half the utilisation realisable in the most favourable circumstances; and

the sun does not shine continuously enough to favour the practical use of the apparatus.—On the heat due to magnetisation, by M. Pilleux. He was able to heat, to more than 200°, the iron core of an electro-magnet, with the alternative currents of a Meritens' machine; a non-magnetic core was not heated. Using various iron and steel cores, the coercitive force is proved to increase their heating under frequent magnetisation and de-magnetisation; it acts like resistance to the passage of electricity.—On the absorption-spectrum of pernitric acid, by M. Chappuis. This spectrum is important, especially as a means of verifying that ozone has been prepared with oxygen exempt from nitrogen.—On the electrolysis of distilled water, by M. Tommasi. His experiments prove that water may be electrolysed, even by the current of a very weak battery, provided the calories liberated by this battery are at least equal to the calories absorbed by water in being decomposed, about sixty-nine calories.—On the determination of nitric and nitrous acid in the state of ammonia, by M. Guyard.—On the effects of compression on the hardness of steel, by M. Lan. The compression of fused steel has been practised both in France and England; increasing the hardness and the proportion of combined carbon.—On the composition of hydrated carbonic acid, by M. Wroblewski. At zero temperature and about 16 atm. it consists of 1 eq. of carbonic acid and 8 eq. of water.—On the bisulphydrate and cyanhydrate of ammonia, by M. Isambert.—Action of sulphuretted hydrogen on saline solutions of nickel and metals of the same group, by M. Baubigny.—On ammoniacal chlorides of zinc, by M. André.—On the hydrate of sulphuretted hydrogen, by M. de Foucrand.—Synthesis of quinine, by M. Maumené. The discovery of H_2N furnished him with the means of this synthesis—details of which are not yet given.—Action of fuming nitric acid, and action of hydrochloric acid on pilocarpine, by M. Chastaing.—Gastric microzymas and pepsine; remarks on M. Gautier's note of March 6, by M. Béchamp.—On the existence of products similar to ptomaines in gastric and pancreatic digestion of several albuminoid matters, by M. Béchamp.—Digestion of fatty and cellulosic matters, by M. Duclaux. The emulsion of fatty matters by the pancreas he regards as a phenomenon almost exclusively physical (not produced by diastase). The agents of digestion of cellulose seem to be small rod-like organisms, which one finds in seeds in the crop of birds or the paunch of ruminants. M. Faye recalled former experiments of his own on emulsion.—On the resistance of African asses to charbon fever, by M. Tayon.—Researches on the nervous system of larvæ of dipterous insects, by M. Brandt.—The Alcyonarians of the Bay of Marseilles, by M. Marion.—On the development of the ganglion and the ciliated sac in the bud of Pyrosoma, by M. Joliet.—Artificial reproduction of witherite, strontianite, and calcite, by M. Bourgeois.—On the artificial reproduction of a crystalline hydrated silicate, by M. de Schulten.—On the limit between the lias and the inferior oölite, according to documents left by Henri Hermite, by M. Vélain.

April 10.—M. Blanchard in the chair.—The following papers were read:—On the secular displacements of planes of the orbits of three planets, by M. Tisserand.—Movements acquired by different parts of a liquid within a vessel or reservoir, whence it escapes by an orifice, by M. de Saint Venant.—Philosophical essay on the method named by its author the "Science of order," by M. Villerceau.—Use of instantaneous photography for analysis of movements in animals, by M. Marey. He gives details of his photographic rifle, as applied to birds' flight. A central axis, rotated by clockwork twelve times in a second, when a detent is released, commands all the pieces. There is an opaque disc, with a small hole; behind this a disc with twelve holes, which rotates intermittently; and behind this a sensitised plate, circular or octagonal, on the margin of which the images appear. To get good effects in the phenakistiscope it was necessary to increase the number of images, and M. Marey found 1-1400th second (as against 1-720th before) sufficient exposure. M. Marey found the chief results of his study by the graphic method confirmed. He makes some remarks on bats' flight, which is difficult to photograph.—On some recent types of fossil plants (continued), by M. de Laporta.—Note on the quarantines imposed at Suez on maritime arrivals from the extreme East, by M. de Lesseps. He holds the measures taken are useless and vexatious. The evil (cholera) should be vigorously attacked at the centres of infection formed by the large concourses of pilgrims, and care taken to disinfect putrid dejections, and destroy objects that may have been contaminated.—On the necessity of destroying the winter egg of phylloxera, by M. Balbiani.—On the winter egg of phylloxera, by M. Mayet.—Observations of comet *a*, 1882, at Lyons Observatory (Brünner 6 inch equatorial), by M. Gonessiat.—Observations of the same at the Roman College, by M. Tacchini.—Observations of solar eruptions in 1881; spectrum of Well's comet, by the same. There are two maxima of the former between ± 10° and ± 30°, and more eruptions appeared in the north than in the south; 40 metallic eruptions were observed, against 10 in 1880. (Curves of the solar phenomena are given).—On hypercycles, by M. Laguerre.—On the integration, by Abelian functions, of certain equations with partial derivatives of the first order, by M. Picard.—On Fuchsian functions, by M. Poincaré.—On the theory of uniform functions of a variable, by M. Mittag-Leffler.—On general inversion, by M. Vanacek.—Resistance of a prismatic and homogeneous bar, of supposed infinite length, to transversal shock and longitudinal shock, by M. Boussinesq.—Experimental researches on the thermal conductivity of minerals and rocks, by M. Thoulet. The novelty of his method (applied to glass, forged iron, and anhydrite) consists in substituting a precise estimation of times for determination of temperatures.—Evaluation of thermal conductivity by measurement of times during a variable period, by M. Lagarde.—On electrolysis, by M. Tommasi. He proves the law that when a voltaic current traverses several electrolytes, it is necessary (for decomposition to occur) that the quantity of calories produced by the pile be equal to the sum of the calories absorbed by each electrolyte *plus* the calories required to overcome the total resistance of the electrolytes.—Researches on the solubility of aluminates of lime in water; influence of this on the final hardening of hydraulic materials, by M. Landrin.—On the relation between isomorphism, atomic weights, and comparative toxicity of metallic salts, by Mr. Blake. His experiments (in which the substances were introduced directly into the blood) prove, in opposition to M. Richet, an intimate connection between chemical function and physiological action.—On some physical properties of bichlorised camphor, by MM. Cazeneuve and Didelot.—Peptones and alkaloids; reply to M. Béchamp, by M. Tanret.—On the rapidity of propagation of the inoculated bacterium of charbon, by M. Rodet, with M. Davaine. He found great irregularity in the effects of destruction of the inoculated part.—The puceron of Latania, by M. Lichtenstein.—On the density and the chlorination of sea-water obtained in the *Travailleur* in 1881, by M. Bouquet de la Grye. The density and saltness are shown to increase on passing from the ocean to the Mediterranean. The surface-waters are less salt and dense than the lower, and generally the increase varies in the same sense as the depth. Measurements of density at 400 m. depth, opposite the Rhone mouth, and in the Gulf of Gascogne, indicated a difference of height of 0·72 m. (agreeing with M. Bourdalone's observations).—On a recent communication of M. Dieulafait, on ophitic rocks of the Pyrenees, by M. Virlet d'Auost.

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