

1880). The lowest limit of this map was fixed by conditions of the diffraction-apparatus, and not by a falling-off of the sensitiveness of the plates at this low point; for, when a prismatic apparatus was used, photographs were obtained which show a continuous spectrum down as far as λ 12,000.

In a subsequent paper (*Phil. Trans.*, 1881, p. 887), Capt. Abney, working with Lieut.-Col. Festing, R.E., applied this new extension of photography to a research on the influence of the atomic grouping in the molecules of the organic bodies on their absorption in the infra-red region of the spectrum. The authors believe that their results indicate, without much doubt, that the complex substances they examined can be grouped according to their absorption spectra, and that such grouping, as far as their experiments go, agrees on the whole with that adopted by chemists. They have more confidence in their results, as they were careful to select such bodies as might be regarded as typical; but, of course, much patient labour of many, for a long period, will be necessary before this new branch of physico-chemical research can be regarded as fully established in any complete form.

Capt. Abney has since carried on his work in this new region of the spectrum at different elevations during a recent visit to Switzerland.

The Davy Medal has been awarded to D. Mendeleeff and Lothar Meyer.

The attention of chemists had for many years past been directed to the relations between the atomic weights of the elements and their respective physical and chemical properties; and a considerable number of remarkable facts had been established by previous workers in this field of inquiry.

The labours of Mendeleeff and Lothar Meyer have generalised and extended our knowledge of those relations, and have laid the foundation of a general system of classification of the elements. They arrange the elements in the empirical order of their atomic weights, beginning with the lightest and proceeding step by step to the heaviest known elementary atom. After hydrogen the first fifteen terms of the series are the following, viz. :—

Lithium	7	Sodium	23
Beryllium	9.4	Magnesium	24
Boron	11	Aluminium	27.4
Carbon	12	Silicon	28
Nitrogen	14	Phosphorus	31
Oxygen	16	Sulphur	32
Fluorine	19	Chlorine	35
		Potassium	32

No one who is acquainted with the most fundamental properties of these elements can fail to recognise the marvellous regularity with which the differences of property, distinguishing each of the first seven terms of this series from the next term, are reproduced in the next seven terms.

Such periodic reappearance of analogous properties in the series of elements has been graphically illustrated in a very striking manner with respect to their physical properties, such as melting-points and atomic volumes. In the curve which represents the relations of atomic volumes and atomic weights analogous elements occupy very similar positions, and the same thing holds good in a striking manner with respect to the curve representing the relations of melting-points and atomic weights.

Like every great step in our knowledge of the order of nature, this periodic series not only enables us to see clearly much that we could not see before, it also raises new difficulties, and points to many problems which need investigation. It is certainly a most important extension of the science of chemistry.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The examiners for the Natural Science Tripos in 1883 are Lord Rayleigh, Mr. Vernon Harcourt (Oxford), Dr. A. M. Marshall (Owens College), Dr. R. D. Roberts, Mr. J. N. Langley, Mr. L. Fletcher (Oxford) of the British Museum, Mr. A. Hill, and Dr. Vines.

The time for the presentation of the report of the Syndicate appointed to frame regulations for the Doctorates of Science and of Letters is extended to the end of next term.

The increased work of the museums and the larger number of departments has caused an excess of expenditure over the ordinary income 3000*l.* allowed by the University, during the

past year. The expenditure has included a provision of microscopes for the morphological and physiological laboratories at a cost of nearly 150*l.*, and a Bianchi air-pump for the chemical laboratory, costing 83*l.* The balance which has accrued is 804*l.* which is asked for as a special grant from the chest.

Mr. A. S. Shipley, of Christ's College, has been nominated to study at the Zoological Station at Naples for the first six months of 1883.

A Clothworkers' Exhibition of 52*l.* 10*s.*, tenable for three years, will be awarded by means of the examination of the Oxford and Cambridge Schools Examination Board in July next. The successful candidate must be or become a non-collegiate student at Oxford or Cambridge.

There will be an examination at Gonville and Caius College, beginning on March 9, 1883, for one Shuttleworth Scholarship, value 60*l.* per annum, tenable for three years, open to medical students of the University, who are of at least eight terms' standing. The subjects are Botany and Comparative Anatomy; practical work will be given as part of the examination. The scholarship may be held with any other scholarship at the College, and a candidate may be recommended at the same time for a foundation scholarship. Particulars may be obtained from the Rev. A. W. W. Steel, Tutor of the College.

The following nominations have been made to the Electoral Board of the under-mentioned professorships, with varying tenure of office to secure due rotation :—Plumian of Astronomy: Prof. Stephen Smith (Oxford), the Astronomer Royal, Prof. Adams, Mr. Spottiswoode, P.R.S., Prof. Stokes, the Master of Caius (Dr. Ferrers), Prof. Cayley, and Mr. Todhunter. Mechanism and Applied Mechanics: Sir John Hawkshaw, Lord Rayleigh, Messrs. R. F. Martin, W. Airy, and Coutts Trotter (Trinity), the Master of Emmanuel (Dr. Phear), Mr. W. H. Besant, and Prof. Cayley. Physiology: Prof. Humphry, Prof. Huxley, Mr. J. N. Langley, Prof. Burdon-Sanderson, Dr. Vines, Dr. Pye-Smith, Prof. Paget, Prof. Stokes. Knightbridge of Moral Philosophy, Prof. Caird (Glasgow), Mr. Leslie Stephen, Mr. J. Venn, Prof. Fowler (Oxford), Prof. Hort, Prof. Seeley, Mr. Todhunter, and Dr. Campion. The Boards of Physics and Chemistry and of Biology and Geology have concurred in recommending that students who have passed in the Mathematical Tripos may be permitted to enter the second part of the Natural Science Tripos without passing in the first part. It is thought desirable to encourage mathematical students thus to take up the practical and experimental work in physics required of the Natural Science students; at present they have not time for studying the elementary parts subjects required of the latter.

SOCIETIES AND ACADEMIES

LONDON

Linnean Society, December 7.—Sir J. Lubbock, Bart., president, in the chair.—The following gentlemen were elected Fellows of the Society:—The Rev. R. Baron, F. O. Bower, T. H. Corry, O. L. Fraser, D. Houston, A. W. Howitt, H. McCallum, E. A. Petherick, S. Rous, and H. C. Stone.—The Rev. R. T. Murray showed specimens of *Althæa hirsuta*, *Vicia Orobus*, and *Phlomis fruticosa*, obtained by him last summer in Somerset.—Mr. W. T. Thiselton Dyer exhibited and explained maps illustrative of the rapid spread of Phylloxera in Spain and Portugal, observing that within the last year quite a wide area of the wine-growing districts therein were affected. He also exhibited photographs and made remarks on the Cinchona cultivation in Ceylon.—Mr. W. B. Espeut drew attention to some Kola nuts, and mentioned their remarkable sobering effects after intoxication by spirituous liquors.—Mr. G. Brook read notes on some little known Collembola and the British species of the genus *Tomonocerus*. Tullberg refers to their occurrence in Sweden, but the four species in question have not hitherto been accorded a British habitat.—A paper by J. G. Otto Tepper was read on the discovery of above ninety species of Tasmanian plants near Adelaide, South Australia.—A contribution by Dr. W. Nylander and the Rev. J. M. Crombie was read, viz. on a collection of exotic lichens made in Eastern Asia by the late Dr. A. C. Maingay. Those enumerated were from British Burma, China, and Japan; some are interesting as illustrative of lichen distribution, and others as new species and varieties.—Remarks on the genera of sub-family Chalcididæ with synonymic notes and descriptions of new species of Leucospididæ and Chalcididæ was a paper by Mr. F. Kirby.—The Rev. R. P. Murray afterwards

made some remarks on cleistogamic flowers of *Hoya carnosa*, producing fertile seed.

Institution of Civil Engineers, December 5.—Sir W. G. Armstrong, C.B., F.R.S., president, in the chair.—The paper read was "On the Sinking of two Shafts at Marsden, for the Whitburn Coal Company," by Mr. John Darglish, M.Inst. C.E.

EDINBURGH

Royal Society, December 4.—The Right Hon. Lord Moncrieff, president, in the chair.—The President, in opening the 100th session of the Society, gave a brief historical statement of its origin.—Obituary notices were read of Mr. Darwin, Prof. Emile Plantamour of Geneva, Mr. Charles D. Bell, Dr. Wm. Robertson, Sir Daniel Macnee, Mr. David Anderson of Morton, Mr. John McCull ch, Mr. Samuel Rayleigh, and Prof. Spence.—The Rev. Dr. W. R. Smith exhibited specimens of Dr. A. Guébbard's electro-chemical method of figuring equipotential lines, which had been sent him by the author.—The Astronomer Royal for Scotland communicated a telegram from J. R. Hind, of the *Nautical Almanac*, correcting the time of ingress of Venus upon the sun's disc.

PARIS

Academy of Sciences, December 4.—M. Jamin in the chair.—The President presented to M. Dumas the medal struck in honour of the fiftieth anniversary of his election to the Academy, and M. Dumas spoke in acknowledgment.—Presentation of tome iii. of the third part of the "Recueil des Memoires, Rapports et Documents relatifs à l'Observation du Passage de Venus sur le Soleil, en 1874," by M. Dumas.—*Résumé* of measurements of the Daguerrian photographs of the Venus transit in 1874 by the French Commission, by MM. Fizeau and Cornu. About fifty selectep photographs from the four stations were measured by two observers or controlled by an equivalent operation. The 94 results represent 33,840 independent points. In a table are shown the values of the ratio of the distance between the centres to the sum and the radii for all the photographs measured.—Memoir on the vision of material colours in motion of rotation, and on the respective velocities, estimated in figures, of circles, one diametrical half of which is coloured and the other half white; velocities corresponding to three periods of their motion, from the extreme velocity to rest, by M. Chevreul.—On a letter of M. Spørers relative to a peculiarity of solar mechanics, by M. Faye. If there were surface currents from the solar poles to the equator (as Dr. Siemens' theory requires), the spots should be carried in the same direction. But M. Spørers' observations for twenty years, and those of Laugier, Carrington, and others, agree in showing displacement of spots in latitudes to be either *nil* or insignificant; and if there is any such tendency in spots far from the equator, it is rather towards than from the poles. The retardation observed in surface rotation towards the poles, M. Faye attributes to ascending and descending movements in the internal mass.—Notice on a new optical apparatus for the study of flexure, by MM. Lœwy and Tresca. It consists of three parts (1) at the observer's end a reticule of horizontal wires viewed by a lens, before which is a total reflection prism throwing lateral light along the optic axis; the eyepiece has also movable wires for measurement; (2) at the opposite end, an object holder, with stretched horizontal wires, illuminated; (3) in the middle, a lens with silvered surface, but transparent at the centre, and of such a focus that it reproduces in the plane of the reticule before the eyepiece, either the image of one set of wires by reflection, or that of the other by transparence.—On *rouget* or *mal rouge* of pigs, by M. Pasteur. This disease, called by Dr. Klein (London, 1878) *pneumo-enteritis* of the pig, has destroyed more than 20,000 pigs this year in the Rhone Valley. M. Pasteur considers Dr. Klein quite mistaken as to the nature and properties of the parasite, which is of figure 8 form, and like the microbe of chicken cholera, but finer, less visible, and quite different physiologically. He has found a method of protective inoculation.—Researches on the presence of nitric acid and ammonia in water and snow obtained in Alpine glaciers by M. Civalie, by M. Boussingault.—Order of appearance of first vessels in the leaves of Cruciferae; demonstration of the distinctly basipetal ramification in these leaves, by M. Trécul.—On the connections (*enchainements*) of the animal world in primæval times, by M. Gaudry. He gives a sketch of the first part of a projected work on this subject.—Chemical studies on maize (continued), by M. Leplay. This relates to potash and lime-bases in organic combination with vegetal acids or tissues of maize

—On the gallicolar Phylloxera, by M. Henneguy.—On the pendulum, by M. Lipschitz.—Formula for determining how many prime numbers there are not exceeding a given number, by M. de Jonquières.—On a mode of transformation of figures in space (continued), by M. Vanecek.—On the transmission of an oblique pressure, from surface to interior, in an isotropic and homogeneous solid in equilibrium, by M. Boussinesq.—On the effect of oil calming the agitation of the sea, by M. Bourgois. Oil affects the breaking of the waves, but not sensibly the undulations themselves.—Method for determination of the ohm, based on the induction by displacement of a magnet, by M. Lippmann.—On the terrestrial induction of planets, and particularly on that of Jupiter, by M. Quet. The planets probably contain iron. With equality of magnetic powers, Jupiter would (next to the sun) exercise the greatest induction on the earth, because of its great volume and rapid rotation; but if its magnetic power were, e.g., ten times that of the sun, variations of the compass might reveal some of the principal periods of that planet. The compass might, within certain limits, show to what point a planet is rich in iron or magnetic substances.—On the currents produced by nitrates in igneous fusion, &c. (second note), by M. Brard. He describes an electrogenerative fuel, which, in any hearth, yields both heat and electricity; and an electrogenerative hearth in which these agents may be generated with any fuel.—On a method of transformation of tricalcic phosphate into chlorinated compounds of phosphorus, by M. Riban.—On a new hydrocarbon, by M. Louise. This is named *benzylene stylyene*, C₈H₂ (C₇H₇) (C₂H₃)₂. It is got by making benzyl act on mesitylene in presence of anhydrous chloride of aluminium.—On an unalterable linseed powder prepared for poultices, by M. Lailles. The oil is eliminated.—On cerebro-spinal ganglions, by M. Ranvier.—On the microsporidia or porospermida of Articulata, by M. Balbiani.—The migrations of the puceron of red galls of the country elm, by M. Lichtenstein.—Researches on digestion in cephalopod molluscs, by M. Bourquelot.—Geological history of the syssidera of Lodran, by M. Meunier.—Reply to a note of M. Musset, concerning the simultaneous existence of flowers and insects on the mountains of Dauphiné, by M. Heckel.

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