the banks of the Daintree we saw a palm-tree cocoa, which far exceeds the unique specimens in the garden of the same genera from Brazil in grandeur and gracefulness. While cutting a given line on the banks of the river Johnstone for the purpose of examining the land, an enormous fig-tree stood in the way, far exceeding in stoutness and grandeur the renowned forest giants of California and Victoria. Three feet from the ground it measured 150 ft. in circum erence; at 55 ft., where it sent forth giant branches, the stem was nearly 80 ft. in circumference. The River Johnstone, within a limited distance of the coast, offers the first and best inducements to sugar cultivation."

WE are glad to observe signs of life in Dundee, says the *Scottish Naturalist*. That town, long noted for its commercial enterprise, has had nearly an equal, but not enviable, celebrity for its poverty and deadness in regard to the study of natural science. But now we trust that that reproach will soon be wiped away, and that the members of the recently founded Dundee Naturalists' Society, a copy of whose constitution is before us, will do good work, and show their fellow-citizens that there are other and more valuable *dona Dei* in the fields, woods, and mountains of the interesting county of Forfar, than that wealth for which the inhabitants of the town of the *donum Dei* are deservedly remarkable. The Society has already upwards of forty members, which number will probably soon be considerably increased. We recommend to the Society the formation of a good local museum of the natural productions of Forfarshire.

IN the forty-first volume of the *Journal of the Asiatic Society of Bengal*, Mr. G. E. Dobson has drawn attention to a particularly interesting feature in the osteology of the Rhinolophine Bats. In the genera *Phyllorhina*, *Triænops* and *Cælops*, he finds that in the innominate bone the ilium sends forward a process from its upper part, which meets and anchyloses with an extension of the ileo-pectineal spine to form a second foramen above that around which the obturator muscles arise. This peculiarity has not been observed in any other mammal.

THE additions to the Zoological Society's Gardens during the last week include a St. John's Monkey (*Macacus sancti-johannis*) from China, and a Java-Chevrotain (*Tragulus javanicus*) presented by Captain Nutsford; a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. W. Webster; three Passenger Pigeons (*Ectopistes migratorius*) from North America, purchased; an Egyptian Monitor (*Monitor niloticus*) six feet long; and a Tuberculated Lizard (*Iguana tuberculata*) from the West Indies, deposited.

SCIENTIFIC SERIALS

American Journal of Science and Arts, March.—This number commences with an interesting paper, by Prof. Leconte, On the Great Lava Flood of the West, and on the Structure and Age of the Cascade Mountains. The flood, commencing in Middle California in separate streams, became in Northern Oregon and Washington absolutely universal; the whole country, mountain and valley, being buried several thousand feet. Its extent cannot be less than 200,000 to 300,000 square miles; its average thickness is probably 2,000 ft., and extreme thickness 3,700 ft. From the structure of the Cascade Range (which extended throughout the entire region of the flood) and palæontological evidence, the author thinks the flood began to occur during or after the Miocene; and the process of flooding probably continued, by successive fissure-flows of lava, chiefly in the Cascade and Blue Mountain Ranges, until the Post-Tertiary; the liquid matter having been squeezed out by horizontal and vertical pressure, while water, percolating through the hot mass, generated volcanoes that continued the upbuilding process.—Dr. Blake of San Francisco has a paper On the Connection between Isomorphism, Molecular Weight, and Physiological Action. One of the conclusions arrived at is, that among compounds of the more purely metallic elements, the quantity of substances in the same isomorphous group required to produce analogous changes in living matter, is less as the atomic weight of the electro-positive element increases.—Mr. Carey Lea describes some experiments made to determine whether it is a general law that when a metallic compound reducible by light is placed in contact with an oxidisable body (or one capable of uniting with Cl, Br, or I, as the case may be), the capacity of reduction of the compound by any particular part of the spectrum is influenced by the *colour* of the body placed in contact with it. But he did not succeed in thus generalising Vogel's results; which, however, he does not regard as contradicted or disproved.—Some experiments by Prof. Wright on the oxidation of alcohol and ether by ozone, seem to indicate that the vinegar process might be materially accelerated by passing ozonised air through the apparatus.—Prof. Marsh communicates a notice (bearing on the genealogy of the modern horse) of new equine mammals from the Tertiary formation; and we further note papers On Recent Dredging Operations in the Gulf of St. Lawrence (Mr. Whiteaves); On Fossils figured in the Illinois State Geological Report (Mr. Meek); On Dissociation of certain Compounds at very low Temperatures (Mr. Leeds), &c.

Der Naturforscher, February.—We may first note, in this number, an account of some valuable researches by MM. Pettenkofer and Voit, as to the significance of the carbohydrates in nutrition. The authors conclude that carbohydrates, in the animal system, always pass entirely into carbonic acid and water, and do not produce fat; but they save (*ersparen*) the fat produced from albumen, and this in proportion to the quantities of the albumen-fat and the carbohydrate. There is also, in the biological department, a succinct statement of Prof. Haeckel's "Gastraea" theory.—In geology, some observations by M. G. Laube appear to indicate that the transport of *débris* and stones by ice in East and West Greenland is by no means a common thing; and a note by M. Albert Heim describes and explains the formation of certain huge cauldron-like cavities in solid rock in the Gletschergarten at Lucerne.—From an examination of plant-remains found in amber, Prof. Caspary has inferred that Prussia, in the Amber period, must have been much warmer than now; certain Arctic Ericaceæ, supposed to be of the period, probably flourished on lofty mountains.—M. Merget's recent observations on thermo-diffusion of gas in leaves, and those of M. Reinke on the function of leaf-teeth, are also given; while MM. Fliche and Grandeau study the relation between chemical composition of the ground and vegetation of *Pinus pinaster*. This plant, while a flint-loving species, yet absorbs a considerable quantity of lime; and in soils with much lime, the increased absorption of this salt is accompanied with a decrease in the other ash constituents, especially potash (this being probably the cause of the bad condition of the tree in such soil).—In the department of physics, we have several notes from English sources: On the Elements present in the Sun (Lockyer); On the Affinities of the Magnetic Metals, and On Molecular Phenomena in Glowing Iron (Barrett); On Propagation of Sound in Fog (Reynolds), &c. And in chemistry, there is a note by M. Thomsen, treating of the influence of temperature on chemical phenomena of heat; also a popular summary of M. Ebermayer's researches as to the presence of ozone in the air.—Astronomy is represented by papers on the star shower of November last, and on the direction of the large axes of cometary orbits.

Bulletin de l'Academie Royale de Belgique. No 1, 1874.—In this number M. de Wilde makes some contributions to the theory of bleaching of vegetable fibres which contain incrusting and other matters. He considers that there is substitution of chlorine for hydrogen in the alkaline liquid, which has served to dissolve the incrusting matter, and that chlorine acts, besides, in decomposition of the water, formation of hydrochloric acid, and fixation of oxygen in the organic matter.—The same author communicates notes on the preparation of acetylene, the action of hydrogen on acetylene and ethylene under the influence of platinum black, and the action of the electric effluvia on some gases and gas-mixtures. In the last he confirms MM. Thenard's observations; and acetylene, he finds, is condensed by the effluvia into a liquid which solidifies rapidly, becoming yellow; the solid detonates under the action of heat. Sulphurous anhydride and oxygen combine directly to form sulphuric anhydride.—Continuing his researches on glyceric derivatives, M. Henry describes an octobromide obtained by action of bromine on tetrabromide of dipropargyle; and a paper by M. Spring, describing new syntheses of hyposulphurous acid and of trithionic acid, is of theoretical importance as showing the relations between the sulphates and hyposulphates, and between the latter and trithionates.—

M. Gosselet furnishes a detailed account of the southern band of Devonian limestones in the district Entre-Sambre-et-Meuse; and M. Selys de Longchamps makes some additions to a synopsis of the Cordulina.—A programme of five questions for medal competition is announced, the subjects being briefly these: disturbing causes in determination of the electromotive force and inferior resistance of a battery element; relations of heat to the phenomena (especially periodic) of vegetation; embryonal development of Tunicata; composition and mutual relations of albuminoid substances; coal system of the Liège valley.

Archives des Sciences Physiques et Naturelles, Feb. 15, 1874.—In this number M. Dufour gives a detailed account of his researches on the variation of temperature which accompanies diffusion of gases through a porous partition. After describing the apparatus (in which a porous vessel, with thermometer and other tubes inserted in its gutta-percha stopper, was enclosed in a cylindrical glass vessel, and this, enveloped in loose cotton, in a larger earthen vessel), the author studies first the influence of the dry or humid state of gases coming into contact with the porous wall, without diffusion; next, variation of temperature where there is no change of pressure; and third, variation where there is such change. With constant pressure, there is fall of temperature on the side where the denser gas is; and rise on the other side. Each current seems to have a heating effect where it enters the porous wall and a cooling one where it issues. With change of pressure, where this rises within the vessel, through endosmose of a lighter gas, the temperature slightly increases, sinking again as the pressure tends to equilibrium. Where exosmose of a lighter gas causes diminution of pressure in the vessel, the reverse occurs.—From observations of the partial solar eclipse of May 26 last, at three Italian stations, D'Aoste, Moncalieri, and Florence, Prof. Denza finds no sensible influence on the declination needle, either as regards its regular diurnal movement, or the absolute value of its displacement. He is confirmed in the conclusion, previously formed (on data of former eclipses), that no connection has hitherto been demonstrated between the two orders of cosmic facts, eclipses and phenomena of terrestrial magnetism.—M. Charles Lory communicates a note on some facts of structure in the central chains of the Alps.—The *Bulletin Scientifique* gives, as usual, a valuable series of notes on recent progress in Physics, Geology, Zoology, and other branches.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, March 26.—On the Motions of some of the Nebulæ towards or from the Earth, by William Huggins, D.C.L., LL.D., F.R.S.

The observations on the motions of some of the stars towards and from the earth, which I had the honour to present to the Royal Society in 1872, appeared to show, from the position in the heavens of the approaching and receding stars, as well as from the relative velocities of their approach and recession, that the sun's motion in space could not be regarded as the sole cause of these motions. "There can be little doubt but that in the observed stellar movements we have to do with two other independent motions—namely, a movement common to certain groups of stars and also a motion peculiar to each star." *

It then presented itself to me as a matter of some importance to endeavour to extend this inquiry to the nebulæ, as it seemed possible that some light might be thrown on the cosmical relations of the gaseous nebulæ to the stars and to our stellar system by observations of their motions of recession and approach.

Since the date of the paper to which I have referred, I have availed myself of the nights sufficiently fine (unusually few even for our unfavourable climate) to make observations on this point. The inquiry was found to be one of great difficulty, from the faintness of the objects and the very minute alteration in position in the spectrum which had to be observed.

At first the inquiry appeared hopeless, from the circumstance that the brightest line in the nebular spectrum is not sufficiently coincident in character and position with the brightest line in the spectrum of nitrogen to permit this line to be used as a fiducial line of comparison. The line in the spectrum of the nebulæ is narrow and defined, while the line of nitrogen is double, and each component is nebulous and broader than the line of the nebulæ. The nebular line is apparently coincident with the middle of the less refrangible line of the double line of nitrogen. *

The third and fourth lines of the nebular spectrum are undoubtedly those of hydrogen, but their great faintness makes it impossible to use them as lines of comparison under the necessary conditions of great dispersive power, except in the case of the brightest nebulæ.

The second line, as I showed in the paper to which I have referred, is sensibly coincident with an iron line, wave-length 495·7; but this line is inconveniently faint, except in the brightest nebulæ.

In the course of some other experiments my attention was directed to a line in the spectrum of lead which falls upon the less refrangible of the components of the double line of nitrogen. This line appeared to meet the requirements of the case, as it is narrow, of a width corresponding to the slit, defined at both edges, and in the position in the spectrum of the brightest of the lines of the nebulæ.

In December 1872 I compared this line directly with the first line in the spectrum of the Great Nebulæ in Orion. I was delighted to find this line sufficiently coincident in position to serve as a fiducial line of comparison.

I am not prepared to say that the coincidence is perfect; on the contrary, I believe that if greater prism power could be brought to bear upon the nebulæ, the line in the lead spectrum would be found to be in a small degree more refrangible than the line in the nebulæ.

The spectroscope employed in these observations contains two compound prisms, each giving a dispersion of 9° 6′ from A to H. A magnifying-power of 16 diameters was used.

In the simultaneous observation of the two lines it was found that if the lead line was made rather less bright than the nebular line, the small excess of apparent breadth of this latter line, from its greater brightness, appeared to overlap the lead line to a very small amount on its less refrangible side, so that the more refrangible side of the two lines appeared to be in a straight line across the spectrum. This line could be therefore conveniently employed as a fiducial line in the observations I had in view.

In my own map of the spectrum of lead this line is not given. In Thalén's map (1868) the line is represented by a short line to show that, under the conditions of spark under which Thalén observed, this line was emitted by those portions only of the vapour of lead which are close to the electrodes.

I find that by alterations of the character of the spark this line becomes long and reaches from electrode to electrode. As some of those conditions (such as the absence of the Leyden jars, or the close approximation of the electrodes when the Leyden jars are in circuit) are those in which the lines of nitrogen of the air in which the spark is taken are faint or absent, the circumstance of the line becoming bright and long, or faint and short inversely, as the line of nitrogen suggested to me the possibility that the line might be due not to the vapour of lead but to some combination of nitrogen under the presence of lead vapour. As, however, this line is bright under similar conditions when the spark is taken in a current of hydrogen, this supposition cannot be correct.

A condition of the spark may be obtained in which the strongest lines of the ordinary lead spectrum are scarcely visible, and the line under consideration becomes the strongest in the spectrum, with the exception of the bright line in the extreme violet.

I need scarcely remark that the circumstance of making use of this line for the purpose of a standard line of comparison is not to be taken as affording any evidence in favour of the existence of lead in the nebulæ.

Each nebula was observed on several nights, so that the whole observing time of the past year was devoted to this inquiry. In no instance was any change of relative position of the nebular line and the lead line detected.

It follows that none of the nebulæ observed show a motion of translation so great as 25 miles per second, including the earth's motion at the time. This motion must be considered in the results to be drawn from the observations; for if the earth's motion be, say, 10 miles per second from the nebulæ, then the nebula would not be receding with a velocity greater than 15 per second; but the nebula might be approaching with velocity as great as 35 miles per second, because 10 miles of this velocity would be destroyed by the earth's motion in the contrary direction.

The observations seem to show that the gaseous nebulæ as a

* Proceedings of the Royal Society, vol. xx. p. 392.

* Proceedings of the Royal Society, vol. xx. p. 380.