cavalry and infantry of your own; otherwise, some day or other, either in a country intersected with woods, or in some open plain furrowed into deep undulations, one of the two arms in which you are deficient will take you in one or both flanks, and you will be surprised, broken, and routed.

GEORGE ROLLESTON

## SOCIETIES AND ACADEMIES

### LONDON

**Chemical Society**, April 21.—Prof. Williamson, F.R.S., president, in the chair. T. Patchett was elected a Fellow. Prof. Roscoe, F.R.S., delivered a lecture on "Vanadium." This metal was discovered in 1830 by Sefström, who also ascertained some of the most peculiar characters of the substance, and prepared some of its compounds in the pure state. Sefström not having leisure to prosecute the full examination of the new metal, handed over his preparations to Berzelius; and it is to the investigations of the great Swede that we owe almost all our acquaintance with the chemistry of vanadium. He found the atomic weight of the metal = 68·5, and wrote its oxides :—VO, $VO_2$, $VO_3$, and its chloride $VCl_3$. Some years afterwards Rammelsberg observed that the mineral vanadinite, a double salt of lead vanadate and lead chloride, is isomorphous, with apatite and with mimetesite, the former containing phosphoric, the latter arsenic acid. This crystallographic analogy would have led to the conclusion that the oxide of vanadium in the vanadinite has the formula $V_2O_5$, agreeing with the corresponding oxides of phosphorus and arsenic, $P_2O_5$, and $As_2O_5$. But the unyielding facts Berzelius had obtained in his analysis, and according to which the oxide in question was represented by the formula $VO_3$, compelled to regard vanadinite as an exception to the law of isomorphism. Prof. Roscoe, having come into the possession of a plentiful source of vanadium, determined to ascertain whether there really was such an exception, or whether Berzelius's formula may not perhaps be erroneous. He soon found the latter to be the case. He proved that the substance supposed by Berzelius to be vanadium, is not the metal, but an oxide, and that the true atomic weight of the metal is 51·3. Thus the $VO_3$ of Berzelius becomes $V_2O_5$, corresponding to $P_2O_5$ and $As_2O_5$. The lecturer went on to demonstrate that the characters of the vanadates bear out the analogy of $V_2O_5$, with $P_2O_5$ and $As_2O_5$, and vanadium, hitherto standing in no definite relation to other elements, must therefore be regarded as a member of the well-known Triad class of elementary substances, comprising nitrogen, phosphorus, boron, arsenic, antimony, and bismuth. The above-mentioned source of vanadium is a by-product obtained in the preparation of cobalt from the copper-bearing beds of the lower Keuper sandstone of the Trias at Alderley Edge, in Cheshire.

The President, in proposing a vote of thanks to the lecturer, called attention to the great service Prof. Roscoe had rendered chemical science by his successful investigation of vanadium. The President's remarks were fully endorsed by Profs. Frankland and Odling, and the meeting expressed its appreciation of Prof. Roscoe's lecture by prolonged applause. Prof. Hofmann, from Berlin, who was present at the meeting, favoured the Society with some observations on a compound ($C H_2 N_2$), which he had obtained when treating sulpho-urea with silver oxide. The body is distinguished by its great tendency to polimerise. Dr. Hofmann further communicated that a compound isomeric with chloral (the new anæsthetic) had recently been discovered by two Berlin chemists. It differs from the ordinary chloral by possessing a much higher boiling point.

**Geological Society**, April 13.—Sir P. de Malpas Grey Egerton, Bart., M.P., F.R.S., vice-president, in the chair. Mr. S. W. North, of Castlegate, York, was elected a Fellow of the Society. The following communications were read :—

1. A letter from Dr. Gerard Krefft, dated Sydney, 29th January, 1869, accompanying a model of the left lower incisor of *Thylacoleo carnifex*, Owen, and the original fragment from which the model was made. Dr. Krefft also referred to the fossil remains of herbivorous marsupials in the museum at Sydney, which included, according to him, besides a great number of Wombats (*Phascolomys*), many wombat-like Kangaroos or Wallabies (*Halmaturus*). He proposed to divide the Kangaroos into the following groups :—

1. *Macropus*, dentition as in *Macropus major*.
2. *Halmaturus*, with the premolar permanent, divided into two sub-groups :—
   *a*. True Wallabies, with the premolars long, narrow, and compressed, and the rami of the lower jaw but slightly anchylosed.
   *b*. Wombat-like Wallabies, with the premolars compact, rounded, and molar-like, and the rami of the lower jaw firmly anchylosed.

Illustrative sketches and photographs accompanied this paper. Prof. Owen remarked upon the importance of the researches made by Dr. Krefft and Prof. Thompson. No traces of man had been found. The numerous remains of mammals, especially the herbivorous species, had doubtless been carried into the caves by *Thylacoleo*. Prof. Busk inquired on what evidence Prof. Owen decided that the tooth of *Thylacoleo* was that of a Carnivore. Prof. Owen indicated the remarkable compression of the tooth and the absence of the spatulate form proper to the Kangaroos as characteristic of *Thylacoleo* and indicative of carnivorous habits. Mr. W. Boyd Dawkins stated that *Thylacoleo* was most closely allied to *Plagiaulax*, which was probably a true Herbivore. He indicated the importance of the question, as if *Thylacoleo* were a Carnivore, *Plagiaulax* would be one also. Prof. Owen remarked that *Plagiaulax* was also a Carnivore. The premolars resembled the small tubercular molars of the Hyenas, Felidæ, &c. The anterior tooth, associated with the small tubercular tooth, was compressed and sharp pointed. The low condyle forming part of the angle of the jaw, was such as occurs in *Thylacinus*. Dr. Duncan remarked that it was by no means necessary that all carnivorous mammals should be formed upon the same type, and that he did not see why there should not be a carnivorous form of the kangaroo type. The chairman said that the settlement of these questions must now be postponed until we obtain further materials. He mentioned the discovery by Dr. Krefft, in the interior of Australia, of a species of fish resembling *Lepidosiren*, and possessing singular affinities to some of the Devonian fishes.

2. "On the Fossil Remains of Mammals found in China." By Prof. Owen, LL.D., F.R.S., F.G.S. The specimens of teeth described by the author were obtained by Robert Swinhoe, Esq., late H. M. Consul at Formosa, chiefly by purchase in the apothecaries' shops at Shanghai. They included two new species of Stegodon (named *S. sinensis* and *S. orientalis*), a new Hyena (*H. sinensis*), a new Tapir (*Tapirus sinensis*), a new Rhinoceros (*R. sinensis*), and a species of Kaup's genus Chalicotherium (*C. sinense*). The author remarked that the whole of these teeth presented an agreement in colour, chemical condition, and matrix, which led to the conclusion that all belonged to the same period. But for the presence of the Chalicotherium, they would have been referred either to the Upper Pliocene or the Post Pliocene period. The author did not consider that the occurrence of the Anoplotherioid species need affect the determination of the age of the fossils, especially as Chalicotherium departs in some respects from the type genus Anoplotherium, and is not known from deposits older than the Miocene. The Chairman called attention to the remarkable association of forms among the fossils described by Prof. Owen. Prof. Busk remarked that the materials at command seemed to him insufficient for the establishment of new species. He observed that the distinctive characters of *Stegodon sinensis* appeared to be very slight, and that the Hyena was probably *H. spelæa*. The tooth of Rhinoceros might be a milk-molar of *R. sumatranus*. Mr. W. Boyd Dawkins suggested that, as the specimens were obtained from apothecaries, there was no evidence of the contemporaneity of the fossils. Mr. H. Woodward stated that Mr. Swinhoe had himself obtained a series of these fossils from a cave many miles inland, he believed on the course of the Yang-tse-kiang. Mr. Woodward also called attention to Mr. Hanbury's paper on Chinese Materia Medica, in which many fossil teeth of mammalia are noticed. Prof. Owen, in reply, stated that great quantities of the fossils had passed through his hands, and that he had selected for description those which, from their minute agreement in chemical and other characters, might justly be inferred to be derived from caves of the same age.

3. "Further discovery of the Fossil Elephants of Malta." By Dr. A. A. Caruana. Communicated by Dr. A. Leith Adams, F.G.S. The author described a new locality in Malta in which the remains of elephants had been found recently—the Is-Shantin fissure at the entrance of Micabbiba. It was filled with a compact deposit of red earth containing fragments of limestone, many teeth and fragments of bones of elephants, associated with bones of large birds. The author found three small

shark's teeth, and a small tooth which he regarded as belonging to a Hippopotamus. He indicated the nature of the teeth and bones of elephants found by him in the newly-discovered fissure. The whole of the five localities in which ossiferous fissures have been discovered are in the same part of the island; and the author concluded with some remarks upon the geological conditions under which the remains of mammalia must have been accumulated, and upon the probability that a connection then existed between Malta and Africa. In a note appended to the paper, Dr. A. Leith Adams stated that the supposed tooth of Hippopotamus was a germ true molar of one of the pigmy elephants, and that the shark's teeth had probably been derived from the Miocene deposits. Prof. Busk remarked that there was no doubt that three species of elephants had lived in Malta. Capt. Spratt said that it appeared to him that the chief interest of the communication lay in the greater comparative abundance of the larger species of elephant in the new locality.

**Royal Geographical Society**, April 11.—Sir R. I. Murchison, President, in the Chair. The first paper was on a Pundit's explorations in Western and Central Thibet in 1868, by Major T. G. Montgomerie, R.E. The previous exploration having furnished some information as to the districts between Rudok and the Thok Jalung gold-field, it was decided to send the third Pundit to Rudok, and through Rawung and Tingche, north of the Aling Gangri Peaks. A reported trade route from Thok Jalung to Tengri-noor lake, and thence to Lhasaon, was to be attempted; failing this, the route by Majin and Shellifuk to Tadum Monastery. The result has been to give definite information as to the character of the great elevated plain of Thibet, 15 to 16,000ft. above sea level, extending probably to Sew Choo, nearly to the great wall of China. The Pundit, as one of a party of Bisahiris, went from Spiti to Demchok, on the upper Indus; the river was 270ft. broad, and 5ft. deep in July—velocity of stream $2\frac{8}{10}$ miles per hour; Rudok had not been visited; officers had penetrated to within 12 miles of the Fort, where the Jong-pon or Governor resides. The Pundit determined the position; the Fort is on a hill of 250ft., with 4 monasteries and 150 houses round it. July 22nd.—The party proceeded eastward through Rawung and Tingche to Dak-korkor, a standing camp and annual fair. Large and small salt lakes were passed, and three days' march of a waterless country, the soil of a dazzling white. Five days north he heard of a district called Tung Phaiyu-Pooyu, of the same character, very lofty, named from high snowy-peaks, probably E. Kiun-kuenlun. A large river is said to flow N. and E. to China; the population is numerous, consists of Dokpas under Lhasa: The snow-white plains have been noticed east of Changchenmo Pass; no high peaks were seen to north and east. All accounts and observations confirm the existence of great plains from the Chang Thang of Rudok to China; the Pundit identified "Jiling," with Sining, N. lat. 37, E. long. 102. The party reached Dak-korkor, 20 miles N. of Aling Gangri, during the annual fair. Robbers attacked the camp. The Jong-pon levied a black mail from the traders to avoid pillage, probably sharing the plunder. The Pundit proceeded eastward by the Aling Chu river, which falls into lake Hagongcho. He passed lake Chakchaka, whence Nepal, &c., is supplied with salt. These lakes are nearly connected. A salt field of 20 miles by 10 is nearly on a level with the lakes. The Pundit heard of seven gold-fields besides those visited, Thok Sailung and Thok Jalung, and those of the northern district. South of Thok Jalung the gold bearing rocks were left. The supply in the gold districts is inexhaustible.

From Thok Jalung they passed through Majin—the country drained eastwards, partly undulating and partly level; all about 16,000ft. above the sea. They reached Kinglo on the large river Chu Sangpo, unfordable in summer, flowing east into a large lake Cho Sildu, which receives three large streams but has no exit. Shellifuk Monastery lies south of this lake from Kinglo. They were obliged to turn off the Tengri-noor route, and go south-west to Lake Mansarowae. Crossing the Nagchail and Riego ranges, offshoots of Kailas Peak, numerous borax fields were passed, furnishing a sufficient supply for the potteries of Europe. A tax of 10 annas or 1s. for above 240 lb. only is imposed. Large herds of black wild yaks, wild asses, numbers of Hodgsonian antelope, wild goats and sheep, including Ovis Ammon wolves, reddish hares, marmots, and a kind of fox were observed. The lakes were tenanted by quantities of geese, ducks, and storks; eagles and vultures were seen everywhere. Robbers abounded, but went off at the sight of guns. The Pundit surveyed the Mansarowae Lake; the water was sweet; no exit. He failed to join the Ladak caravan to Lhasa, but proceeded to Shigatse, where he was stopped, and obliged to return. His servant reached the Tadum Monastery, but was sent back. He crossed into Nepal by the Muktinath, pass of only 13,000 feet.

Mr. Shaw described the white plains which he had traversed for 10 or 12 miles as resembling ice covered with snow, one being soda; under it lay crystallised salt. The thieves were encouraged by the authorities, but were so afraid of guns, that a quantity of stolen sheep were voluntarily restored on the approach of European shooting party. Sir Henry Rawlinson considered there were no mountains north of Rudok, but that the plain descended by a gentle slope, affording facilities for a greatroad to be connected with the road from India. He referred to a Persian work, Tarik-i-Ras-chidi, written by a cousin and general of the great Baber, giving full topography of Thibet and Kashmir. Mr. Saunders exhibited a map of Thibet, he believed Central Asia proper was encircled by mountains with an escarpment descending rapidly on the north as well as the south, and argued against the hypothesis of a gentle slope. He pointed out the remarkable depth of the Himalayan gorges. The Pundit's servant who had penetrated behind Mr. Everest, found the base of the peaks to be only on a level of 6,000ft., the gorges 20,000ft. deep. Dr. Campbell stated that a Chinese army had invaded Nepaul by the Muktinath Pass.

The President remarked that our knowledge of the country had till now been derived from the Jesuits and Thibetan survey. The discussion made him realise our ignorance of it.

A second paper was read by Captain I. Gregory on an attempt made to communicate from Assam with Catholic missionaries now residing at Sakka and on the Mekong and Salween rivers. The envoy was turned back. A letter received from the missionaries was read, mentioning that Europeans were casting cannon for the Mahommedan king. They expressed their desire to aid English travellers, and mentioned that last year they had received "a nice young gentleman from Bathang named Cooper." The bishop is at Ta-Tsien. Col. Yule mentioned that 10 years ago a letter from the Vicar Apostolic at Bonga to Bishop Des Mesures at Rangoon first disclosed the presence of Catholic missionaries in Thibet. Information was sent by them concerning the rivers flowing from the plateau of Thibet, between the Bramapootra and the Upper Yang-tze-kiang. The upper waters of these and the Mekong Salween and Irrawaddy, issue from a higher latitude than supposed and can be traced to 35°. The determination of the disputed questions connected with these rivers is proposed as an object of future exploration. A paper on the Upper Irrawaddy is shortly to be read before the Society.

**Royal Astronomical Society**, April 8.—William Lassell, F.R.S., president, in the chair. The minutes of the last meeting were read and confirmed, and 37 presents announced. A paper by Mr. Plummer on the Orbit of the Comet of 1683 was read. From the observations of Flamsteed, a parabolic orbit was decided by Halley, but recently Clausen of Dorpat has computed an elliptical orbit. The author, at Mr. Hind's suggestion, re-examined the matter, making all possible corrections, and using the latest star places, and finds as the result that the orbit is parabolic, so that the return of the comet in a few years hence is not to be expected.—Mr. Tebbutt, junr., sent some observations from Australia, of the Lunar Eclipse on January 17, 1870. During the totality, the details of the surface of the moon were distinctly seen through the copper-coloured tint pervading the disc, which was given at the edges. A number of telescopic stars became visible in the path of the moon, and several occultations of these during the eclipse were noted. The times of contact were likewise given. Mr. Bird read a paper on "The Floor of Plato." There are now 35 spots known on this space, 8 of them having been discovered since November 1869. The result of 771 observations was given in a tabular form, showing the degree of visibility in the first 6 lunations of a year, in the last 6 lunations, the increase and decrease of visibility, and the amount of the variation. The observations were made with telescopes of 6 to 9 inches aperture, the greater number coming from Mr. Crossby's Reporter of the latter size. The President announced that there was a possibility of the Government providing the means of transit to and from Mediterranean ports, for observers of the eclipse in December next, and he invited the Fellows willing to take part in an organised scheme to send in their names, as nothing could be done until the probable number was known. The Astronomer Royal opened a discussion on the subject by tracing the course of the eclipse from Portugal to the Black

Sea, and stated that the only points which were especially available would be Xeres near Cadiz, or Gibraltar; Oran in Algeria, and a station in Sicily, near Syracuse or Catania. [This subject has already been fully discussed in our columns.] The remainder of the evening was occupied by Mr. Watson, who brought forward his hypothesis, the result of ten years' study of the moon, that both water and air exist on the side invisible to us. His argument was, that from his telescopic views of the moon he was convinced water and volcanoes had left traces of their action; that chemically and geologically air and water were necessary for such action; that the air and water could not get away from the moon, and that as they were not present on the side visible—which he admitted to the fullest extent—they must be existing on the other side—although he could give no other proof in support of his assertion. Mr. Watson's views were severely criticised in a jocular tone by Capt. Noble, and more seriously by Col. Strange, who said that Mr. Watson having wished to extract an opinion whether he was right from the society, could not have it, as that body as such never gave an opinion on any communication, and that if distinguished astronomers did not rise to confute him he must not take silence for consent. Even assuming all that Mr. Watson said to be correct, which Col. Strange by no means admitted, there was even another explanation than that offered, viz., that the water had been absorbed into the interior of the moon. Mr. Watson's remarks were a striking example of the danger of bringing forward opinions formed without a foundation of facts.—After electing seven new Fellows, the long and interesting meeting came to an end.

**Anthropological Society of London**, April 19.—Dr. Berthold Seemann, V. P., in the chair. Mr. John Colam, 105, Jermyn Street, St. James's; and Mr. David Mitchell Henderson, 1, Carden Place, Aberdeen, and Old Calabar, West Africa, were elected Fellows. Dr. D. Lubach, of Kampen, Holland, was elected a corresponding Member.

A paper, by Mr. Alfred Sanders, was read "On Mr. Darwin's Hypothesis of Pangenesis as applied to the Faculty of Memory." The first question to be asked was—"Is thought a function of the brain?" The author answered it in the affirmative, and cited facts and appearances in physiology, anatomy, pathology, and physics in support of his opinion. Thought could not be considered as a product of the brain-cells any more than light could be produced by the cells of the retina, yet the brain-cells were necessary for the communication between the mind and the external and internal world, and were exhausted in the process of thinking and willing, in the same manner as the cells of the retina were exhausted and required renewal in the process of seeing. Passing to the consideration of the faculty of memory, the author combated the theory of Mr. John Stuart Mill, that the mind is a series of feelings and nothing more, and that memory is an ultimate fact incapable of explanation. The remainder of the paper was devoted to the application of Mr. Darwin's hypothesis of Pangenesis, which the author maintained was capable of explaining the difficulty raised by Mr. Mill; it being granted that the mental faculties depend upon the brain, and that the brain-cells give off self-propagating gemmules indefinitely, everything becomes plain. After describing in detail the action of external impressions on the brain at different times in the life of an individual, some of the many conditions favourable or the reverse to the retention of such impressions, and the dormant and active states of the brain-cells, the author entered into a consideration of the growth of the supposed gemmules, their action at maturity, and their power of self-propagation. Mr. W. B. Kesteven supplemented the paper by a speech of some length in general support of Mr. Darwin's hypothesis, but not of its treatment by Mr. Sanders, and by the exhibition of a series of microscopic anathomical preparations in illustration of his remarks. The discussion was further sustained by Dr. Langdon Down, Rev. Dunbar Heath, Mr. Dendy, Dr. Ellis, M. Robert Des Ruffières, Mr. George St. Clair, the Chairman, and others.

Mr. George C. Thompson contributed a note on "Consanguineous Marriages," urging upon the Society an investigation into the following questions:—1. When the defects commonly attributed to relationship of the parents are exhibited, are the germs of these defects traceable in the parents or their families? 2. When the medical pedigree of the parents is faultless are the children sound and healthy? 3. When any particular excellence occurs in the parents' family, is it transmitted to the children in increased force? Dr. Langdon Down said that after an examination of some five thousand cases of interbreeding he had arrived at the conclusion that the practice was not only not necessarily injurious, but that a methodical and judicious selection in the marriage of close relations would be of enormous value to the community in the improved race of men that would by that means be obtained. Captain Blair cited in support of that view the case of a people on the Ganges, while other speakers adduced conflicting evidence.

**London Mathematical Society**, April 14.—Prof. H. J. S. Smith, V.P., in the chair. The Chairman made some remarks on a problem in kinematics; Mr. Cotterill communicated some propositions bearing on residuals and former papers of his own read before the society; Mr. Crofton drew attention to a locus in Cartesian ovals; Mr. Jenkins gave a geometrical construction for showing the spherical excess of a triangle; and the chairman mentioned some focal properties of skew surfaces to which he had been led.

**Palæontographical Society**, April 8.—Annual general meeting; Dr. J. S. Bowerbank, F.R.S., in the chair.—The Council reported that the Society was in a most prosperous condition; that the volume for the present year was in progress, and would be published in the autumn; that new monographs by Mr. Carruthers, on the Fossil Cycades, by Dr. Lycett on the Fossil Tregoniæ, and by Prof. Owen on the Purbeck Mammalia, were in preparation. It was added that Mr. H. Woodward would continue the Monograph on the Trilobites, left unfinished through the death of Mr. Salter, and that Mr. Wood would issue a supplement to the Crag Mollusca. The ballot for the council and officers was taken, and the following gentlemen were elected. President, Dr. S. J. Bowerbank. Vice-Presidents: Prof. Bell, C. Darwin, T. Davidson, and Prof. Owen. Council: Prof. Ansted, Dr. J. J. Bigsby, W. Boyd Dawkins, Prof. Duncan, Sir P. Egerton, Bart., J. W. Flower, R. Hudson, J. W. Ilott, J. Gwyn Jeffreys, H. Lee, Sir C. Lyell, Bart., J. Pickering, J. Prestwich (Pres. Geol. Soc.), Prof. Tennant, C. Tyler, H. Woodward. Treasurer, Searles Wood; Honorary Secretary, Rev. T. Wiltshire.

### EDINBURGH

**Royal Society, April 18.**—"On Change of Apparent Colour by Obliquity of Vision." By Robert H. Bow, C.E., Edinburgh. Mr. Bow observed the peculiarity of chromatic vision in the month of January, when experimenting upon the perfection of definition at different parts of the retina. Coloured objects seen obliquely undergo two changes: first, they become less obviously coloured,—this is particularly the case with greens, yellows, and oranges; and secondly, the colour becomes altered in character, most strikingly so in the cases of pinks, purples, and scarlets; pinks and purples become blue, and a brilliant scarlet (such as given by biniodide of mercury fixed with gum arabic) becomes successively orange and yellow, according to the degree of obliquity. The phenomena are most satisfactorily produced when the coloured objects are held on the nasal side of the observing eye. The author speculates on the influence this discovery may have upon the theories of colour sensation, and upon our knowledge of the nature of colour-blindness and the anatomy of the retina.

### PARIS

**Academy of Sciences**, April 18.—A memoir by M. Moutard, entitled "Researches upon the Equations with partial derivatives of the second order, with two independent variables," was communicated by M. Bertrand.—M. Boileau presented a memoir on the determination of the latent work in systems, with uniform or uniformly periodical movements.—M. G. A. Hirn communicated a second note on the specific heat of water towards its maximum of density.—A note by M. Croullebois on the variations of the index of refraction of water with temperature, was presented by M. Balard. Upon this subject the author had come to a conclusion directly opposite to those of Arago and M. Jamin, and maintained that the index of refraction attains its maximum at the maximum density of water (4° C = 39° 1 F.) and decreases both above and below that temperature. He described the apparatus employed by him.—M. L. Sonrel communicated a note on the Aurora Borealis of the 5th April, of which he described the appearance and the various phenomena accompanying it. The Aurora only became visible in the evening, but it was then decreasing in intensity; it was visible over the greater part of Europe, and everywhere presented the same characters. It was accompanied by a strong and disagreeable odour, which was noticed both in France and Germany. Magnetic perturbations were observed both on the 4th and 5th of April.—M.

Delaunay presented some remarks upon M. Flammarion's note on the law of the rotatory movement of the planets, by M. G. Quesneville. The author maintained that M. Flammarion's numbers were incorrect.—A note on the spectrum-analysis of a solar spot, by M. G. Rayet, was also communicated by M. Delaunay. The author stated that while observing the spectrum of an immense spot in the south-west region of the solar disc, he saw the line C become luminous in the portion answering to the nucleus.—The greater number of the papers presented to the meeting were on chemical subjects. M. Descloiseaux presented a note on the clinorhombic form of the red oxide of mercury.—M. H. Sainte-Claire Deville indicated some experiments which he is now completing, upon the decomposition of aqueous vapour by iron. The phenomena, according to him, resemble in some important points, the mechanical phenomena of vaporisation and condensation; that is to say, they favour hygrometric laws.—M. J. P. Prat presented some experimental researches upon gold and its compounds. The author described the formation of a spongy gold by the addition of bicarbonate of potash to a solution of sesquichloride or gold, adding oxalic acid to the filtrate, and boiling it for two minutes. The spongy gold, heated with a combination of sulphuric and iodic acids, is entirely oxydised; the product dissolves in forming nitric acid. The solution, when diluted and heated, gives a precipitate of protosulphate of gold. The author noticed further the chlorides, iodides, and oxides of gold, two of the latter being new compounds ($Au^2$ $O^2$ and Au $O^2$). A current of chlorine passed over a heated chloride of gold may produce a volatile chlorine superior to the sesquichloride.—M. H. Debray communicated a note on the assay of silver containing mercury. After noticing and explaining the process of Levol for effecting this assay in the humid way, the author described the method adopted by him, which consisted in heating a small portion of the silver, known to contain mercury, in a small crucible of gas charcoal for about a quarter of an hour, when the mercury is driven off and the silver remains as a button.—M. Balard presented a note by M. E. Reboul, on the hydriodates and hydrochlorates of monobrominated æthylene and propylene. —In a note on black phosphorus, M. Blondlot stated that after many unsuccessful trials by Thenard's method, he had prepared this substance by distilling phosphorus, or heating it to 212° F. under water in contact with mercury. Its colour is due to a multitude of black points, which disappear when the substance is fused and reappear on its cooling. At first the black phosphorus thus prepared, contained a trace of mercury, but after several distillations this disappeared, although the coloration was retained. The black material is more volatile than ordinary phosphorus, of which the author believed it to be an allotropic form.—M. Boussingault communicated a note by M. Musculus, on a dextrine insoluble in cold water, prepared by treating starch with crystallisable acetic acid. The author considered their insolubility of this dextrine to be due to its retaining the organisation of the starch grains. He described its characters and behaviour under various circumstances.—M. L. Henry presented two important memoirs, one on the chloronitric and bromonitric æthers of glycerine; the other, on the direct combination of allylic compounds with chloride of iodine and hypochlorous acid. In the former paper he described the action of nitric acid upon the halogenated æthers of glycerine, and especially the compounds *dichloromononitrine* ($C^3H^5$), $Cl^2$ ($NO^3$), and *monochlorodinitrine* ($C^3H^5$), Cl $(NO^3)^2$,.—M. A. Béchamp communicated a note on the formation of urea by the action of hypermanganate of potash upon albuminous matters, in which he maintained the correctness of his assertion that this reaction takes place, and described his mode of experimentation and the results of the analysis of his products.—M. P. Guyot communicated the results of his investigations into the toxical properties of some products of the phenic group—azuline and lydine.—M. J. Cloquet presented a note by M. L. Van Backer, containing a list of earthquake shocks and volcanic eruptions recorded as having taken place in the Dutch East Indies since the commencement of the sixteenth century. This list is derived from Junghuhn's "History of volcanoes."—M. H. Baillon made some observations on the crests of ice which have been noticed on the stems of plants, and stated that this phenomenon was a purely physical one, and had nothing to do with the life of the plant.—According to M. Guérin-Méneville, the parasitic insect, called *uji* or *oudji*, which attacks the silkworms in Japan, is a Dipterous fly, like the Chinese one noticed by M. Castellani, and the French fly which has transferred its attentions to the *Cynthia*-silkworm. M. Guérin names the parasite *Tachina oudji*.—M. N. Joly, in a letter to M. Dumas, noticed the occurrence of a distinct rotation of the embryos in the eggs of the axolot.—Dr. Pettigrew, presented some observations on the flight of Insects, with reference to M. Marey's communications on this subject. Dr. Pettigrew claims the priority in determining that the wings of insects in movement describe a figure of 8.—M. Andral, presented a note on the temperature of new-born infants; M. Moyret proposed the employment of perchloride of iron for the purification of the air evacuated from hospitals; and M. Namias forwarded some remarks upon the employment of bromide of potassium as a medicine, in reply to which M. Balard, made some observations, reccommending the use of bromide of sodium. Of the following communications the titles only are given:—A note on cholera by M. Levery; a note on the movement of liquids by M. d'Estoquois; and a note on vapour in a state of saturation, by M. Leloup.

### VIENNA

**Imperial Academy of Sciences**, March 17.—A memoir was communicated by Professor V. Graber "On the resemblance of the structure of the female external sexual organs in the Locustidæ and Acrydii from the point of view of their developmental history." The author stated that in these two families of saltatorial orthopterous insects the external sexual organs of the females are exactly similar in number, form, and position in their original condition when the young animals leave the egg, and that it is only by changes taking place during development that the great differences observable in the mature insects are brought about. These developmental changes were described by the author in detail.

March 24.—Professor J. Stefan presented a preliminary communication "On a new experimental method of analysing the movement of sounding columns of air," by Professors A. Toepler and L. Boltzmann; and also a paper by himself "On the excitation of longitudinal vibrations by transverse ones."—Dr. S. Stern communicated a memoir "On the resonance of air in free space, as a contribution to the theory of sound."—Dr. A. Boué spoke upon the accumulation of erratic blocks in the sedimentary rocks, and in tertiary sandstones or conglomerates. He discussed the various hypotheses which have been put forward to account for these phenomena, which occur in various formations from the older carboniferous sandstones to the most recent beds. For the Eocene and Miocene rocks the author adopted the theory of their having been floated by ice; he also opposed the notions of those geologists who ascribe the excavation of lake-basins to the action of glaciers and assume the existence of glaciers at all geological periods.—A memoir was communicated by Professor Brücke "On the physiological significance of the partial decomposition of fat in the small intestine."

### PHILADELPHIA

**American Philosophical Society**, March 4.—"On the Periods of Certain Meteoric Rings." By Daniel Kirkwood.

I. The Meteors of April 20. In the *Astronomische Nachrichten*, No. 1632, Dr. Weiss called attention to the fact that the orbit of the first comet of 1861 very nearly intersects that of the earth, in longitude 210°; the point passed by the latter at the epoch of the April meteoric shower. A relation between the meteors and the comet, similar to that recently detected between the November meteors and the comet of 1866, was thus suggested as probable. Is this hypothesis in harmony with facts? and if not, are our present data sufficient for determining with any reasonable probability the true period of the April meteors?

Dates of the April Shower.—Prof. Newton selects the following from Quetelet's catalogue as belonging to this period:*

| | | | | | |
|---|---|---|---|---|---|
| 1. | B. C. 687, | 4. | A. D. | 1093, | '4 '5, and '6 |
| 2. | ,, 15, | 5. | ,, | 1122, | '3 |
| 3. | A. D. 582, | 6. | ,, | 1803, | |

Period of the first Comet of 1861.—The elements of this body were computed by Oppolzer, who assigned it a period of 415 y. 4. Now, while it is true that the interval from B. C. 687 to A. D. 1803, is very nearly equal to six periods of 415 years, the slightest examination will show that this period does not harmonise with *any of the intermediate dates*. This fact, then, without further discussion, seems fatal to the hypothesis that the period of the meteors is nearly equal to that of the comet.

* Silliman's Journal for July, 1863.

What is the probable period of the ring?—The showers of 1093-6 and 1122-3 at once suggest a period of from 26 to 30 years. The nodal passage of the densest portion of the ring at the former epoch may be placed anywhere between 1093 and 1096, and that of the latter, in either 1122 or 1123. The entire interval from B. C. 687 to A. D 1803 is 2490 years, or 88 periods of 28 y. 295 each; and the known dates are all satisfied by the following scheme :—

| | | | | | |
|---|---|---|---|---|---|
| B.C. | 687 to B.C. 15 | 672.000 yrs. | =24 | periods of | 28.000 each. |
| | 15 to A.D. 582 | 597.000 ,, | =21 | ,, | 28.429 ,, |
| A.D | 582 to 1093.714 | 511.714 ,, | =18 | ,, | 28.429 ,, |
| | 1093.714 to 1122.143 | 28.429 ,, | = 1 | ,, | 28.429 ,, |
| | 1122.143 to 1803 | 680.857 ,, | =24 | ,, | 28.369 ,, |

These coincidences indicate a period of about $28\frac{1}{3}$* years, corresponding to an ellipse whose major axis is 18.59. Hence the distance of the aphelion is very nearly equal to the mean distance of Uranus. It will also be observed that the time of revolution, which seems to have been somewhat lengthened about the Christian era, was previously one-third of the period of Uranus.

II. The Meteors of December 11-13.

In the catalogue of Quetelet we find the four following extraordinary displays which belong undoubtedly to this period. Observations made in England, 1862, indicate also a more than ordinary number of meteors at the December epoch in that year.

1. A.D. 901. "The whole hemisphere was filled with those meteors called falling stars, the ninth of Dhu'lhajja (288th year of the Hegira) from midnight till morning, to the great surprise of the beholders, in Egypt."—*Modern part of the Universal History*, 8vo. vol. 2, p. 81. Lond. 1780. The date of this phenomenon corresponds to the December epoch, A.D. 901.

2. 930. "Averse remarquable d'ètoiles filantes en Chine."

3. 1571. "On vit à Zurich 'du feu tomber du ciel.'"

4. 1830, 1833, and 1836. The maximum seems to have occurred in 1833, when as many as ten meteors were seen simultaneously. "Dans la nuit du 14 au 12 décembre, on vit, à Parme une grande quantité d'étoiles filantes de différentes grandeurs, qui se dirigeaient presque toutes avec une grande vitesse vers le SSE. A 10 heures et $\frac{1}{4}$, entre les seules constellations du Bélier et du Taureau, on en compta environ une dizaine."

5. (Doubtful.) 1861, 1862, and 1863. Maximum probably in 1862. The meteors at this return were far from being comparable in numbers with the ancient displays. The shower, however, was distinctly observed. R. P. Grey, Esq., of Manchester, England, says the period for December 10-12 was, in 1862, "exceedingly well defined."†

These dates indicate a period of about $29\frac{1}{3}$ years. Thus :—

| | |
|---|---|
| 901 to 930..... | 1 period of 29.000 years. |
| 930 to 1571..... | 22 periods of 29.136 years. |
| 1571 to 1833..... | 9 periods of 29.111 years. |
| 1833 to 1862..... | 1 period of 29.000 years. |

III. The Meteors of October 15-21.

The showers of the following years (see Quetelet's Catalogue) belong to this epoch :—

1. 288. "Apparition en Chine."

2. 1436 and 1439. In each year a remarkable apparition was observed in China.

3. 1743. (Quoted from Herrick, in Silliman's Journal for April 1841.) "A clear night, great shooting of stars between 9 and 10 o'clock, all shot from S.W. to N.E. [*Qu.* N.E. to S.W. ?] One like a comet in the meridian very large, and like fire, with a long broad train after it, which lasted several minutes; after that was a train like a row of thick small stars for twenty minutes together, which dipt N."

4. 1798. "Brandès marque, à Goettingue, un grand nombre d'étoiles filantes dans les observations simultanées qu' il fait avec Benzenberg."

These dates indicate a period of about $27\frac{1}{2}$ years :—

| | |
|---|---|
| 288 to 1439.....42 | periods of 27.405 years each. |
| 1439 to 1743.....11 | ,, 27.636 ,, |
| 1743 to 1798..... 2 | ,, 27.500 ,, |

If these periods are correct, it is a remarkable coincidence that the aphelion distances of the meteoric rings of April 18th—20th, October 15th—21st, November 14th, and December 11th—13th, as well as those of the comets 1866 I, and 1867 I, are all nearly equal to the mean distance of Uranus.

* Herrick assigned a value of 27 years. See Silliman's Journal for April 1841, p. 365.

† Silliman's Journal for May, 1863, p. 461.

## DIARY

*THURSDAY*, APRIL 28.

ROYAL SOCIETY, at 8.30.—On the organs of Vision in the Common Mole: Dr. R. J. Lee.—On an Aplanatic Searcher applied to Microscopes: Dr. Royston Pigott.—On a cause of error in Electroscopic Experiments: Sir Chas. Wheatstone.

ZOOLOGICAL SOCIETY, at 8.30.—Notes on a North-American Batrachian (*Spelerpes rubra*): Mr. St. George Mivart.—Notes on some points in the anatomy of certain Kingfishers: Dr. Cunningham.—On a new gigantic Amphibian, allied to *Lepidosiren* from Queensland :—Mr. G. Krefft.

ROYAL INSTITUTION, at 3.—Electricity: Prof. Tyndall.

*FRIDAY*, APRIL 29.

ROYAL INSTITUTION, at 8.—Popular Myths: Prof. Blackie.

ZOOLOGICAL SOCIETY, at 1.—Anniversary Meeting.

*SATURDAY*, APRIL 30.

ROYAL INSTITUTION, at 3.—Comets: Prof. Grant.

*MONDAY* MAY 2.

ENTOMOLOGICAL SOCIETY, at 7.

SOCIETY OF ARTS, at 8.—Cantor Lecture on Fermentation: Prof. A. W. Williamson.

ROYAL ASIATIC, at 3.

ROYAL INSTITUTION, at 2.—Annual Meeting.

*TUESDAY*, MAY 3.

ANTHROPOLOGICAL SOCIETY, at 8.—The Aboriginal Tribes of the Nilgiri Hills: Major Ross-King.—The Armenians of Southern India: Dr. John Shortt.—The Kajahs of Southern India: Dr. John Shortt.

ROYAL INSTITUTION, at 3.—Moral Philosophy:—Prof. Blackie.

*THURSDAY*, MAY 5.

ROYAL SOCIETY, at 8.30.

SOCIETY OF ANTIQUARIES, at 8.30.

CHEMICAL SOCIETY, at 8.—Vapour Densities: J. T. Brown.—New Cornish Minerals, No. 7: Prof. Church.

ROYAL INSTITUTION, at 3.—Electricity: Prof. Tyndall.

LINNEAN SOCIETY, at 8.

## BOOKS RECEIVED.

ENGLISH.—On Natural Selection: A. R. Wallace (Macmillan and Co.).—Sketches of Creation, illustrated by Prof. Winchell: (S. Low, Son, and Co.)—The Population of an Old Pear Tree, translated from the French of E. Van Bruyssel (Macmillan and Co.).—Records of the Geological Survey of India. Vol. I., parts 1, 2, 3; vol. II., part 1.—Contributions to Botany: J. Miers; vol. 2 (Williams and Norgate).—Symons's Monthly Meteorological Magazine; vol. for 1869.—Trees and Shrubs for English Plantations: A. Mongredien (Murray).

FOREIGN (through Williams and Norgate).—Die Schule der Chimie: Dr. J. A. Stöckardt.—Der Elektromagnetische Telegraph: Dr. H. Schellen.—Le Darwinisme et les générations spontanées: D. C. Rossi.—Catalogus Musei Botanici Lugduno-Batavi: Prof. Miguel.—Verzeichniss von 4793 teleskopischen Sternen: Dr. J. V. Lamont.—Annalen der königlichen Sternwarte; vol. 17.—Der rationelle Wiesenbau: L. Vincent.—Die fünf Sinne des Menschen: W. Preyer.—Zeitschrift für die gesammten Naturwissenchaften; vols. 33, 34: Drs. Giebert und Siewert.—Handbuch der Mathematik: Physik, Geodäsie und Astronomie: Dr. A. Wolf.—Die Erfindung des Fernrohrs und ihre Folgen für die Astronomie.—De la Reforme de l'enseignement supérieur et des libertés Universitaires: C. Schützenberger.—Mémoires de la société royale des Sciences de Liége; vols. 1, 2.

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ERRATA.—In No. 24, page 630, second column, line 10: for "Acalephic" read "Acalephæ."—Page 635, column 1, line 5 from bottom, for "Von Martins," read "Von Martius; and column 2, line 4: for "Martins," read "Martius."