petition with new varieties of silkworms, which are described as possessing many qualities which will render them a most useful addition to the various silkworms now under cultivation.—The Society has been successful in securing two specimens of a fish called the Gourami, from Singapore; attempts have been made to procure some of these fish for introduction into this country, but they have as yet been unsuccessful. The introduction of the *Diospyros*, a Chinese fruit-tree, is recommended, and attempts are being made to acclimatise it.—M. Millet is endeavouring to secure some means of foretelling the approach of cold weather in the spring months, and asks for any observations on the point which others may have made.—An interesting paper by M. J. Lapru, on the Italian bee, points out the superior qualities of that insect, and suggests its more general cultivation.

Jahrbuch der kais. kön. geologischen Reichsanstalt. Band xxiii. Nos. 3 and 4.—The first paper in No. 3 is by Dr. O. Feistmantel On the relation of the Bohemian carboniferous formation to the permian. The palæontological and physical evidence enables the author to arrange these formations as follows:—I. Permian formations. *a* Upper group (with two stages) consisting of red sandstone with bituminous shales, containing animal remains, and red shales with various plant-remains; marl, limestone, and calcareous shales with abundant animal remains. *b* Lower group, or permanent coal-bearing group, containing coal-seams, generally accompanied with bituminous shales. The beds yield permian animal remains, and a rich flora almost entirely non-carboniferous. Red sandstones with *auracarites* are also included in the group. II. Carboniferous formation: grey sandstones and carboniferous shales; coal-seams without accompanying bituminous shales, and without a fauna which can be brought into relation or connection with the permian. The flora shows no admixture of permian types.—In the second article I. Niedzwiedzki gives some account of the basalt rocks met with in the carboniferous basin near Moravian Ostraw; and the other papers in the number are On the occurrence of Tertiary formations in the upper region of the Maritza valley, that is, between the Balkan and the Rhodope mountains in Rumili; and Contributions to the geology of the Fruska Gora in Syrmia.—There are only two geological papers in No. 4, the first of which is a very long contribution, by F. Posepny, On the lead and cadmia veins of Raibl in Carinthia, which is well illustrated with coloured lithographs, showing sections of various vein-stores, ores, minerals, &c., and a map of the workings, &c.—The second paper is by Dr. Mojsisovics, On some triassic fossils from the South Alps; two plates accompany the paper.—Among the "Mineralogical Communications," so carefully edited by Dr. Tschermak, there is one paper of somewhat general interest, An outline of a mechanical theory of the laws of crystallisation, by Dr. J. Hirschwald.

Verhandlungen des naturhist. Vereins d. pr. Rheinlande u. Westpholens, 29ter u. 30ter Jahrgang.—The former of these volumes contains, among other papers, one On Vesuvius, by Von Rath and Von Lasaulx; On the structure of Trilobites, by Von Koenen; On the effect of extreme cold on plants, by Mohr; On *Monas prodigosa*, by Prof. Binz of Bonn; On the pupil of the fox, by Troschel; On benzyl-sulpho-cyanates, by Kekulé; and others on technical points of medicine. In the latter we may note Dr. Braun's description of the Upper Jura, with a geological section; Dr. Umber's measurements of the skulls of numerous mammalia, in which he attempts to find a criterion of their intelligence in the proportion of the anterior to the posterior part of the basis cranii (according to his results the Carnivora are inferior to the Quadrumana; and Horses to Rodents and Marsupials); two papers on the geological and palæontological features of the cave at Balm: one by Rindfleisch On tubercular inflammation; and one by Kekulé On allyl compounds.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, June 11.—Note on the alleged existence of Remains of a Lemming in Cave-deposits of England, by Prof. Owen, F.R.S.

Note on the Absorption-Spectra of Potassium and Sodium at low temperatures, by H. E. Roscoe, F.R.S., and Arthur Schuster.

In order to obtain the absorption-spectrum afforded by the well-known green coloured potassium vapour, pieces of the clean dry metal were sealed up in glass tubes filled with hydrogen, and one of these was then placed in front of the slit of a large Steinhill's spectroscope, furnished with two prisms having refracting angles of 45° and 60°. The magnifying power of the telescope was 40, and was sufficient clearly to separate the D lines with one prism. A continuous spectrum from a lime-light was used, and that portion of a tube containing the bright metallic globule of potassium was gently heated until the green vapour made its appearance. A complicated absorption spectrum was then seen, a set of bands (α) in the red coming out first, whilst after a few moments two other groups appeared on either side of the D lines, the group β (less refrangible) being not so dark as the group γ. These bands are all shaded off towards the red, and in general appearance resemble those of the iodine spectrum. In order to assure ourselves that the bands are not caused by the presence of a trace of an oxide, tubes were prepared in which the metal was melted in hydrogen several times on successive days until no further change in the bright character of the globule could be perceived. On vapourising the metal, which had been melted down to a clean portion of the tube, the bands were seen as before, and came out even more clearly, the globule, after heating, exhibiting a bright metallic surface. An analysis of the potassium used showed that it did not contain more than 0·8 per cent. of sodium, although, of course, the double line D was always plainly seen.

In order to ascertain whether an alteration in the absorption-spectrum of the metal takes place at a red heat, fragments of potassium were placed in a red-hot iron tube, through which a rapid current of pure hydrogen gas was passed, the ends of the tube being closed by glass plates. The magnificent green colour of the vapour was clearly seen at this temperature on looking through the tube at a lime-light placed at the other end. Owing, doubtless, to the greater thickness or increased pressure of the vapour, the bands seen by the previous method could not be resolved by the small spectroscope employed, the whole of the red being absorbed, whilst a broad absorption-band in the greenish yellow was seen occupying the place of the group γ.

The positions of the bands obtained by the first method were measured by means of a telescope and distant scale, and the wave-lengths obtained by an interpolation curve, for which well-known air-lines were taken as references. The following numbers give the wave-lengths of the most distinct, that is, the most refrangible edge of each band. As the measurements had to be quickly made owing to the rapid darkening of the glass by the action of the metallic vapour, these numbers do not lay claim to very great accuracy, but fairly represent the relative positions of the band, and show that they do not always occur at regular intervals, although they are pretty regularly spread over the field, and all are shaded alike.

Bands of potassium shaded off towards red. Wave-length in tenth metre:—

6844		6459		6311		5949	5763
6762		6430		6300	α	5930	β 5745
6710		6400		6275		5901	5732
6666	α	6379	α	6059		5860	5712
6615		6357		6033		5842	5700 γ
6572		6350		6012	β	5821	γ 5690
6534		6331		5988		5802	5674
6494		6322		5964		5781	5667

The bright potassium lines in the red and violet were not seen reversed, the intensity of the lime-light being too small at both extremes to render an observation possible.

In order to ascertain whether the vapour of sodium, which, when seen in thin layers, appears nearly colourless, exhibits similar absorption-bands, tubes containing the pure metal, which had been prepared and preserved out of contact with any hydrocarbon, were prepared, the metal being obtained free from oxide and the absorption-spectrum being observed in the manner already described. As soon as the metal began to boil a series of bands in the blue (Na γ) made their appearance, and shortly afterwards bands in the red and yellow (Na α), stretching as far as the D lines, came out. At this period of the experiment the D lines widened, thus blotting out a series of fine bands occurring in the orange (Na β), some of which could in consequence not be mapped. All the bands of the sodium-spectrum shade off like the potassium bands towards the red.

When the vapour of sodium is examined in a red-hot iron tube the colour of the lime-light as seen through it is a dark blue. As the sodium is swept away by the current of hydrogen passing through the colour becomes lighter, and the transmitted rays can be analysed by the spectroscope. At first the whole red and green and part of the blue is cut out entirely. The D lines are

considerably widened, and an absorption-band is seen in the green, apparently coinciding with the double sodium line, which comes next in strength to the D lines. All the colours, therefore, seem to be shut out except part of the orange, part of the green, and the ultra blue. As the sodium vapour becomes less dense more light passes through, and the same absorption-bands are seen as are observed in the other method. The vapour then has a slight bluish-green tint, but is nearly colourless.

The following numbers give the wave-lengths of the more refrangible edge of the sodium absorption-bands in tenth-metres obtained in the manner above described :—

6668		6361		6105		5999	β 4964
6616		6272		6092		5150	4927
6552		6235		6071		5129	4889
6499	α	6192	α	6051	β	5082	γ 4863 γ
6450		6162		6035		5038	4832
6405		6149		6016		5002	4810

The drawings accompanying the paper show the general appearance of the two absorption-spectra.

Linnean Society.—Anniversary Meeting, May 25.—G. Busk, vice-president, in the chair.—The chairman announced the officers who had been elected for the year (see NATURE, vol. x. p. 72).—It was moved by Mr. Busk, seconded by Mr. Carruthers, and carried unanimously :—"That the secretaries be requested to convey to Mr. Bentham the cordial thanks of the Society for his invaluable services throughout the thirteen years during which he has occupied the president's chair, to express to him the regret with which the Fellows contemplate the loss of his services, and to assure him that the zealous interest which he has taken in the welfare of the Society and the great efforts which he has made with so much liberality and success, to increase its prosperity and usefulness will always be held in grateful remembrance."—It was moved by Mr. Busk and unanimously resolved :—"That the thanks of the Society be also given to Mr. Stainton on his retirement from the office of secretary, with an expression of the Society's deep regret on losing his valuable services in that capacity."

June 4.—Mr. G. J. Allmann, president, in the chair.—The president exhibited a number of living specimens of fire-fly (*Luciola italica*) recently taken by himself in the neighbourhood of Turin, calling attention to the remarkable synchronous emissions of flashes of light by numerous individuals, and pointing out that the phosphorescence is a phenomenon not of darkness merely, but of twilight or night.—Prof. Thiselton Dyer described the structure of the flowers of *Pringlea* and *Lyallia*, which had recently been sent to this country for the first time by Mr. Moseley, from Kerguelen's Land, and which had been analysed by Prof. Oliver, and subsequently by himself. Dr. Hooker pointed out that several peculiarities in the structure of *Pringlea*, the absence of petals and of the usual glands between the bases of the stamens, the exserted anthers, and the papillæ of the stigma extended into a tuft of hair, appeared to point to this plant (a native of a country where there are no winged insects), being a wing-fertilised member of a class of plants that are ordinarily fertilised by insects.—The following papers were then read :—1. Contributions to the botany of the *Challenger* expedition. Presented by Dr. J. D. Hooker, C.B.—XII*a*. *Challenger* Lichens (Cape de Verdes), by Dr. J. Stirton.—XVII*a*. Letter from Mr. H. N. Moseley to Dr. Hooker, dated Cape Otway, Australia, March 16, On the botany of Kerguelen's Land, Marion, and Heard Islands.—XVIII. List of hitherto unrecorded species from Kerguelen's Land, Marion, and Heard Islands, with a note on *Lyallia kerguelensis* Hook f., by Prof. Oliver.—Synopsis of the mosses of the Island of St. Paul, by W. Mitten (Appendix to Dr. Hooker's paper On St. Paul's Island plants).—On the Restiaceæ of Thunberg's herbarium, by M. T. Masters, F.R.S. At the time that the author published his monograph On the South-African Restiaceæ, in the Journal of the Society, vol. viii. p. 211, and vol. x. p. 209, he had had no opportunity of examining the type specimens described by Thunberg. The few figures published by that naturalist are excellent; but his descriptions are often so imperfect that not even the sex of the plant is mentioned. In common therefore with all who had previously studied these plants, the author had to guess at the species intended by Thunberg. Lately, however, by the kindness of the authorities at Upsal, Thunberg's African collections have been transmitted to Kew for examination, and the author availed himself of the opportunity to study the Restiaceæ. The paper now read contains a list of these specimens with their names, synonyms, and such rectifications in the nomenclature as the examination rendered necessary.—On *Napoleona*, *Omphalocarpum* and *Asteranthos*, by J. Miers. The plants forming the small group of the *Napoleoneæ* are confined to two very heterogeneous genera, one from Africa, the other from Brazil. *Napoleona* was discovered in 1787 at Owaree, by Palisot-Beauvois; *Asteranthos* was established in 1820 by Desfontaines, when he associated it with *Napoleona* as a group belonging to *Symplocineæ*. These plants have been ever since a complete puzzle to botanists, who have assigned to them remotely dissimilar positions, the last being that given by the authors of the "Genera Plantarum," who make them a sub-tribe of Lecythideæ, one of their tribes of Myrtaceæ. A careful examination of these plants has convinced the author that most botanists have been wide of the mark in regard to their true affinity. Mr. Miers brought forward a large mass of information concerning *Napoleona*, from which he drew the conclusion that there is nothing in its structure to show the slightest relation to Myrtaceæ; that it is equally irreconcilable with the Barringtonieæ and with Lecythideæ; and in consequence of these negative results we must search elsewhere for its true affinity. This led the author to examine *Omphalocarpum*, a genus from the same region as *Napoleona*, and whose flowers and fruit of similar form grow upon the trunk of the trees. This genus has been generally regarded as belonging to Sapotaceæ; but the authors of the "Genera Plantarum" place it in Ternstrœmiaceæ. *Napoleona* cannot, it is true, belong to Sapotaceæ; but as it offers so many points of resemblance, and as it cannot find a place in any known natural order it must remain the monotype of a distinct family, to be placed in juxtaposition with Sapotaceæ. In regard to *Asteranthos* the author shows by analytical figures that it bears scarcely any resemblance in any of its features to *Napoleona*. A strong resemblance exists in the form of its calyx to that represented by Wight in an Indian species of *Rhododendron*. And there seems nothing therefore to separate *Asteranthos* from other genera of Rhododendreæ, except its more rotate corolla.

Mathematical Society, Thursday, June 11.—Dr. Hirst, F.R.S., president, in the chair.—The president made a statement to the effect that he had much pleasure in announcing to the members present that he had received a letter from Lord Rayleigh in which that gentleman expressed his intention of handing over to the Society the sum of 1,000*l.* to be invested and applied to assist in the publication of the Proceedings, and the purchase of mathematical periodicals. As the subject will be brought before the members more fully in November next, no further action was taken, but the announcement of the munificent offer gave general satisfaction to the meeting.—Prof. Cayley, F.R.S., V.P., having taken the chair, Mr. S. Roberts gave an account of his paper On the parallels of developables and of curves of double curvature.—Lord Rayleigh next read a note On the numerical calculation of the roots of fluctuating functions.—In the absence of the authors, the secretary read parts of papers by Mr. Griffiths and Mr. Routh, F.R.S. In his note On a remarkable relation between the difference of two Fagnanian arcs of an ellipse of eccentricity e, and that of two corresponding arcs of a hyperbola of eccentricity $\frac{1}{e}$ Mr. Griffiths establishes the following relation: $\frac{\text{arc } PP_0 - \text{arc } QQ_0}{\text{arc } P^1P_0^1 - \text{arc } Q^1Q_0^1} = e^2xx_0\xi\xi_0$ where the unaccented letters refer to the ellipse and the accented letters to the hyperbola, and x, ξ, x_0, ξ_0 are the abscissæ of P, Q, P_0, Q_0. The object of Mr. Routh's first paper, viz. Stability of a dynamical system with two independent motions, will be gathered from the following extract :—"The equations of motion of a dynamical system performing small oscillations with two independent motions are of the form

$$A\frac{d^2x}{dt^2} + B\frac{dx}{dt} + Cx + F\frac{d^2y}{dt^2} + G\frac{dy}{dt} + Hy = 0$$

$$A^1\frac{d^2x}{dt^2} + B^1\frac{dx}{dt} + C^1x + F^1\frac{d^2y}{dt^2} + G^1\frac{dy}{dt} + Hy^1 = 0$$

To solve these we eliminate either x or y, and obtain a biquadratic of the form

$$aD^4 + bD^3 + cD^2 + dD + e = 0$$

The whole nature of the motion depends on the forms of the roots of this equation. Rules are given in books on the theory of equations to determine whether the roots are real or imaginary, but this is not exactly what we want to know. It is often

important to ascertain whether the equilibrium about which the oscillation takes place is stable or unstable. The necessary and sufficient conditions for stability are that the real roots and the real parts of the imaginary roots should all be negative. It is proposed to investigate a method of easy application to decide this point."—Mr. Routh's second paper was On rocking stones, and a third was On small oscillations to any degree of approximation.

Anthropological Institute, June 9.—Prof. Busk, F.R.S., president, in the chair.—Sir John Lubbock, Bart., read a paper On the discovery of stone implements in Egypt. The author began with a sketch of the writings and opinions of M. Arcelin and Dr. Hamy, who maintained that the flint implements found along the valley of the Nile, including a hatchet of the St. Acheul type at Deir-el-Bahari, indicated the existence formerly of a true stone age there as in Western Europe. MM. Mortillet and Broca concurred in that view.—On the other hand Dr. Pruner-Bey, and especially Dr. Lepsius, had expressed the opinion that most of the objects described, such as the flint flakes, were naturally produced. M. Chabas also took the same view as Dr. Lepsius, and denied the existence of any evidence of a stone age either in Egypt or elsewhere. On the occasion of a late visit to Egypt with the object of getting conclusive personal evidence on the question, the author found worked flints at various spots along the Nile Valley, especially in the valley of the tombs of the kings of Thebes, and at Abydos, and after carefully weighing the facts and arguments brought forward by MM. Lepsius and Chabas, he was disposed to agree with MM. Arcelin and Hamy in considering that these flint implements really belonged to the stone age, and were ante-Pharaonic. Sir John exhibited a full series of the Egyptian flint implements found by himself during his visit, and the paper concluded with a minute description of each specimen.—Prof. Owen, F.R.S., then read a paper On the ethnology of Egypt. Since the observations recorded in 1861, by Dr. Pruner-Bey, on the race-characters of the ancient Egyptians, mainly based on the characters of skulls, evidences, in the author's opinion, of a more instructive kind have been discovered, chiefly by M. Mariette-Bey. They consist of portrait-sculptures, chiefly statues, found in tombs accompanied by hieroglyphic inscriptions revealing the name, condition, and date of decease. A study of those works led to the conclusion that three distinct types were indicated. (1) The Primal Egyptian, bearing no trace of negro or Arab, but more nearly matched by a high European facies of the present day. (2) The type of the conquering race of Shepherd Kings, or Syro-Arabian, exemplified in the Assyrian sculptures. (3) The Nubian Egyptian, typified in the bas-relief figure of Cleopatra in the Temple of Denderah. In conclusion, the professor drew a graphic picture of the high state of civilisation attained by the Primal Egyptian race, whose exquisite works, done six thousand years ago, are now rendered accessible to man. The paper was amply illustrated by a series of photographs, maps, and diagrams.

Royal Horticultural Society, June 4.—Scientific Committee.—A. Grote, F.L.S., in the chair.—The Rev. M. J. Berkeley exhibited trusses of Pelargonium "St. George," in which all the flowers, and not the central one only, were destitute of spur, thus presenting an illustration of what is termed regular Peloria, and approximating to the genus Geranium.—Messrs. Veitch sent a coffee-bush from Ceylon affected with a fungus, which overruns some 1,000 acres of plantation. This was probably the *Hemileia vastatrix*.—Mr. A. Murray alluded to the moth, *Fronuba yuccasella*, which has the habit of gathering the pollen of *Yucca*, and in so doing often fertilises the stigma.—Dr. Masters showed the roots of a Deodar, which had suddenly died after having been planted about fourteen years. On examination the plant was found infested by mycelium, and on further inquiry it was ascertained that the tree had been planted on the site of an old tan-pit, which had doubtless furnished the nidus for the spawn.—Prof. Thiselton Dyer read the following extract from a letter addressed to Admiral Spratt by his son:—"Dalhousie, Feb. 22, 1874.—On the night of the 10th of this month we had a change of white to blood-looking snow. The native mind was much excited, and said this falling of blood and snow was a sign of some coming great war. . . The blood and snow was snow mixed with dust. Now as the whole of the hills at the foot for some distance had been for many days well saturated, this dust must have come from a long distance, and must have ascended a considerable height. The snow-cloud must have been full of dust, or the atmosphere between us and it, probably the latter. The amount of discoloured snow was $\frac{3}{4}$" and the contents of one superficial foot 12½ grains. Under the microscope it looked like small transparent laminations of mica or silica."—Prof. Thiselton Dyer communicated a note on the temperature of hill and dale.

General Meeting.—W. A. Lindsay in the chair.—The Rev. M. J. Berkeley commented on a new hybrid *Sarracenia*, raised between *S. flava* and *S. purpurea*, also on a plant of *Amorphophallus Berkeleyi*, found at Rangoon by his son Capt. Berkeley, and the stems of which were said to be sold in the Indian markets like asparagus.

PARIS

Academy of Sciences, June 8.—M. Bertrand in the chair.—The president announced the death of M. Roulin, librarian to the Academy, and principal editor of the first volumes of the *Comptes Rendus*.—The following papers were read:—Determination of the number of similar triangles which satisfy four conditions, by M. Chasles.—On the distribution of the heat developed by collision, by M. Tresca. The author was led to this research by observing the production of oblique luminous streaks on the lateral faces of the platinum-iridium bar (described at the last meeting by General Morin) during the process of forging.—Several communications on vine-culture were read, all relating to *Phylloxera*. The first of these was by M. Dumas, entitled "Memoir on the means of repelling the invasion of *Phylloxera*." The author considers ammonium sulphhydrate the safest substance for the destruction of the pest without injuring the vine.—On the progress of the vine disease during winter. On the practical means of opposing the disease, by M. H. Marès. The author advocates likewise the use of ammonium sulphhydrate.—On the employment of carbon disulphide to repel *Phylloxera*, by M. le Baron de Chefdebein.—On the employment of sand in the treatment of vines attacked by *Phylloxera*, extract from a letter from M. J. Lichtenstein to M. Dumas. It appears that the insect cannot make way through sand owing to the loose nature of this substance. Since sand contains no fertilising principle, it is proposed to mix it with ashes and guano. The extract concludes with the following advice:—"Surround your stocks largely with sand, *Phylloxera* will not come, or, if there, it will perish and your vines will recover."—Prof. Cayley communicated a note entitled, "On a Formula of Unlimited Integration."—On the age and position of the Saint-Béat marble, a geological note, by M. Leymerie.—On the minute motions of a material system in stable equilibrium, by M. F. Lucas.—Modification of the commutator of Clarke's machine, by M. A. Barthélemy.—On friction in the collision of bodies, by Mr. G. Darboux.—On the lines of curvature of ruled surfaces, by M. E. Weyr.—Note on the spectrum of Coggia's comet (1874 III.), by M. G. Rayet. The spectrum is continuous from the orange to the blue (spectrum of the nucleus) and is traversed by three bright bands (spectrum of the coma) in the yellow, green and blue.—On the motion of the air in pipes, by M. Ch. Bontemps.—On a physiological peculiarity of Axolotl, by M. C. Dareste. The peculiarity in question is the presence of a mucous substance more or less red and containing blood corpuscles in the cloaca of both sexes during the period of reproduction.—On the metamorphoses of the *Acari* of the families *Sarcoptidæ* and *Gamasidæ*, by M. Mégnin.

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