remarkable Specimens of Old Peruvian 'Ars Plumaria,'" gives a description of two very fine head-dresses in Ancient Peruvian feather-work, which are illustrated by a beautifully executed coloured plate. It is strange, as the author points out, "that the specimens of old Peruvian 'ars plumaria' unearthed from the hundreds of huacas, excavated but too often by vandalic treasure-seekers, have not attracted more attention." The best specimens of feather-mosaic were made in the sixteenth and seventeenth centuries, and the art has now practically died out. —Mr. S. H. Ray abstracts and annotates "Some Notes on the Tannese," by Rev. W. Gray. Mr. Gray has been a missionary in Tanna for twelve years, and so he can speak from adequate personal knowledge; he gives information on dress, circumcision, political organisation, war, kava, religion, social organisation and marriage, the calendar, the winds, and language. This is a valuable supplement to Dr. Codrington's monograph; the section on religion is of especial value. Dr. H. Ten Kate describes and illustrates a collection of ethnographical objects from the Timor Group. The supplement to vol. vii. of the *Archiv* is an account of the Năng, or the Siamese shadow-figures in the Völkerkunde Museum in Berlin, by Dr. F. W. K. Müller. A transcription and translation (in German) of the rhymes of the drama is given, which is a fragment of the Râmâjana. It is illustrated by eleven plates, eight of which are coloured. Vol. viii. commences with the conclusion of Dr. Ten Kate's paper, which is illustrated by four plates. This part is of more general interest, as it deals partly with the religion and the sacred animals of the Timorese and other Indonesians; the author agrees with Pleyte, that the snake cult is indigenous to Indonesia, and is not borrowed from India. There is a useful little table of the distribution of certain objects.—S. K. Kusnezow writes on the death-cult of the Tscheremisse (a Ural-Altaiic people on the Volga, near Kazan). These numbers of the *Archiv* contain the usual valuable notes and bibliography.

SOCIETIES AND ACADEMIES.

LONDON

Royal Society, January 17.—"On Slow Changes in the Magnetic Permeability of Iron." By William M. Mordey.

The conclusions to which the observations lead, so far as they have gone, are:—

(1) The effect is not fatigue of the iron caused directly by repeated magnetic reversals—it is not "progressive magnetic fatigue."

(2) Neither magnetic nor electric action is necessary to its production.

(3) It is a physical change resulting from long-continued heating at a very moderate temperature.

(4) It appears to be greater if pressure is applied during heating.

(5) It is not produced when the iron is not allowed to rise more than a few degrees above the ordinary atmosphere.

(6) It is similar to the effect produced by hammering, rolling, or by heating to redness and cooling quickly.

(7) The iron returns to its original condition on re-annealing.

(8) It does not return to its original condition if kept unused and at ordinary atmospheric temperatures, whether the periods of rest are short or long.

March 7.—"The Action of Heat upon Ethylene, II." By Prof. Vivian B. Lewes.

From the results of the experiments described in the paper it is stated that:—

(1) The initial decomposition of ethylene by heat is very rapid, and requires but a short flow through a heated containing vessel, such primary decomposition, however, being but slowly completed, owing to secondary reactions, which tend to reform ethylene.

(2) Dilution has but little effect in retarding the decomposition of ethylene, unless it be very large.

(3) Increase in rate of flow diminishes the amount of decomposition when the heated area is small, but rapidly diminishes in effect as the length of flow through a heated area increases.

(4) The decomposition of ethylene is chiefly caused by radiant heat, the effect of which is very great as compared with the decomposition due to contact with heated surfaces.

March 21.—"The Cause of Luminosity in the Flames of Hydrocarbon Gases." By Prof. Vivian B. Lewes.

The facts which appear to be established in this paper are:—

(1) That the luminosity of hydrocarbon flames is principally due to the localisation of the heat of formation of acetylene in the carbon and hydrogen produced by its decomposition.

(2) That such localisation is produced by the rapidity of its decomposition, which varies with the temperature of the flame and the degree of dilution of the acetylene.

(3) That the average temperature of the flame due to combustion would not be sufficient to produce the incandescence of the carbon particles within the flame.

In a paper on the action of heat upon ethylene, brought before the Royal Society this spring, the author showed that the decomposition of ethylene into acetylene and simpler hydrocarbons was mainly due to the action of radiant heat, and was but little retarded by dilution, whilst he has shown in this paper that the acetylene so produced requires a considerable increase in temperature to bring about its decomposition when diluted, and it is possible with these data to give a fairly complete description of the actions which endow hydrocarbon flames with the power of emitting light.

When the hydrocarbon gas leaves the jet at which it is being burnt, those portions which come in contact with the air are consumed and form a wall of flame which surrounds the issuing gas. The unburnt gas in its passage through the lower heated area of the flame undergoes a number of chemical changes, brought about by the action of radiant heat emitted by the flame walls, the principal of which is the conversion of the hydrocarbons into acetylene, methane, and hydrogen. The temperature of the flame quickly rises as the distance from the jet increases, and a portion of the flame is soon reached at which the heat is sufficiently intense to decompose the acetylene with a rapidity almost akin to detonation, and the heat of its formation, localised by the rapidity of its decomposition, raises the liberated carbon particles to incandescence, this giving the principal part of the luminosity of the flame; whilst these particles, heated by the combustion of the flame gases, still continue to glow, until finally themselves consumed, this external heating and final combustion adding slightly to the light emitted.

Any unsaturated hydrocarbons which have escaped conversion into acetylene before luminosity commences, and also any methane which may be present on passing into the higher temperatures of the luminous zone, become converted there into acetylene, and at once being decomposed to carbon and hydrogen, increase the area of the light-giving portion of the flame.

"On the Changes in Movement and Sensation produced by Hemisection of the Spinal Cord in the Cat." By C. D. Marshall.

"On the Analysis of Voluntary Muscular Movements by certain new Instruments." By Dr. W. R. Jack.

"On the Spark Spectrum of Argon as it appears in the Spark Spectrum of Air." By Prof. W. N. Hartley, F.R.S.

Chemical Society, March 7.—Dr. Armstrong, President, in the chair.—The following papers were read:—Dimethylketohexamethylene, by F. S. Kipping. This substance is a colourless oil boiling at 174–176°, and is prepared by distilling calcium $\alpha\alpha'$-dimethylpimelate with soda-lime.—The use of barium thiosulphate in standardising iodine solution, by R. T. Plimpton and J. C. Chorley. Barium thiosulphate, BaS_2O_3, H_2O is well adapted for standardising iodine solution, inasmuch as it keeps well, has a high molecular weight, and is readily acted on by iodine.—The melting points of racemic modifications and of optically active isomerides, by F. S. Kipping and W. J. Pope. Dextro-rotatory and racemic π-monobromocamphor melt at the same temperature, and the melting point of the one is not depressed by the presence of the other isomeride; the same is true of the inactive and dextro-rotatory π-monochlorocamphors.—Phenyl ethers of methylene- and ethylene-glycols. Synthesis of α-methylbutyrolactone, by E. Haworth and W. H. Perkin, jun. A number of phenyl ethers of methylene- and ethylene-glycol have been obtained by the use of sodium phenate; α-methylbutyrolactone has been synthesised from ethylic sodiomethylmalonate.—Methylisobutylacetic acid, $CHMe_2CH_2CHMe.COOH$, by W. H. Bentley and M. W. Burrows. This acid was prepared by the distillation of methylisobutylmalonic acid, which in turn was synthesised from ethylic sodiomethylmalonate and isobutyl bromide.

Geological Society, March 6.—Dr. Henry Woodward, F.R.S., President, in the chair.—A new ossiferous fissure in Creswell Crags, by W. L. H. Duckworth and F. E. Swainson. The fissure explored by the authors is about 30 feet above the level of the artificial lake at Creswell Crags. At the top occurred a white earth (with human and other remains) passing down into a red sand with remains of fox, badger, roe-deer, and other mammals. Beneath the latter deposit, and separated from it by a fairly sharp line of demarcation, came the cave-earth proper with palæolithic implements and bones of *Rhinoceros tichorhinus*, *Bison priscus*, *Ursus spelæus*, *Hyæna, crocuta* var. *spelæa*, and *Cervus tarandus*. The authors suppose that this cave-earth was derived from an older deposit, and had been transported to its present place by water, though there is evidence that the transport had been from no great distance. Consequently they followed the fissure inwards, until brought to a stop by a mass of travertine, which they penetrated with a small hole. They hope to explore the fissure beyond this travertine on a future occasion.—Notes on the chemical composition of some oceanic deposits, by Prof. J. B. Harrison and A. J. Jukes-Browne. The authors formerly experienced great difficulty in comparing their analyses of the oceanic deposits of Barbados with those of modern oozes made by Dr. Brazier. Since then Dr. Murray has placed samples of recent red clay and *Globigerina*-ooze at their disposal, and these were analysed by Prof. Harrison and Mr. John Williams. The results of analysis of the red clay were arranged as follows:—Argillaceous constituent 67·85 per cent., pumiceous matter 23·26 per cent., organic constituents 5·88, and adherent sea-salts 3·61 per cent. The authors found that the argillaceous constituent was not a mixture of an orthosilicate of alumina and hydrated peroxide of iron, having the proportion of silica to alumina as 14 to 12, but a more highly silicated compound in which the proportions were as 33 to 12. It was in fact a ferruginous earth, such as would result from the decomposition of palagonite and of a basic volcanic glass, fragments of which were frequent in the Pacific red clays. The pumiceous matter was the débris of an acid pumice containing 7 per cent. of soda, and apparently therefore the pumice of a soda-felsite. Comparing the analyses of the recent red clay with those of Barbadian red clays, they find the differences to be such as would result from mixtures of the palagonitic earth with various acid and basic pumices. A mixture of the palagonitic earth with the pumiceous dust which fell on Barbados in 1812 would have a composition closely corresponding to that of the oceanic clay of Barbados. The recent calcareous ooze closely resembled the more calcareous "chalks" of the Barbadian oceanic series, but the latter contained much colloid silica and fine clay. The differences between the analyses of the recent ooze and of English chalk, when certain allowances are made, were found to be but small. The recent calcareous ooze contained many more *Globigerina*-tests than tertiary or mesozoic chalks, but it is suggested that this is due to our possessing only the surface-layers of the *Globigerina*-ooze. In one important respect all the different kinds of deposit which were examined resembled one another, namely, in the infinitesimally small quantity of quartz which they contained. The authors' examination of the recent oceanic deposits, and a comparison of them with the raised Barbadian deposits, only increased their conviction that the latter were of truly oceanic origin.

Linnean Society, March 7.—Mr. C. B. Clarke, F.R.S., President, in the chair.—Mr. A. Henry was admitted a Fellow.—On behalf of Sir Joseph Hooker, the Secretary exhibited a bronze medal struck in honour of the late Alphonse de Candolle.—Mr. J. E. Harting exhibited a remarkable head and horns of *Cupra ægagrus* recently obtained by Mr. F. C. Selous in Asia Minor, and made remarks on the geographical distribution of this and other allied species.—Mr. G. F. Scott Elliot, who had been absent from England since September 1893, on a botanical exploration of Mount Ruwenzori and the country to the north of the Albert Edward Nyanza, gave an account of his journey and of the results, geographical, botanical, zoological, and political, obtained by him. The country lying north-east of the Victoria Nyanza was described as a large, rolling, grassy plain, some 6000 feet above sea-level, and well adapted for colonisation. He went west from the Victoria Nyanza to Mount Ruwenzori, which is said to have an altitude of 18,000 feet, and spent four months in exploring that district under the great disadvantage of a dense cloud hanging over the mountain the greater part of the day, which often prevented the party from seeing more than fifty feet ahead. The sides of the mountain were clothed at the base with a thick growth of trees resembling the laurel of the Canary Islands; above that, bamboos to the 10,000-feet level; and above that again what the explorer could only liken to a Scotch peat moss in which the traveller sank at every step a foot or more. Large trunks like those of *Erica arborea* of the Canary Islands, but indicating trees 80 feet high, were noticed. Amongst other plants found were a *Viola*, a *Cardamine*, a gigantic *Lobelia*, attaining a height of five or six feet, and a species of *Hyperieum* resembling that found in the Canaries; indeed, the similarity of the flora to that of the Canary Islands was remarkable. Mr. Scott Elliot ascended Mount Ruwenzori to the height of 13,000 feet, finding evidence of animal life and numerous insects to a height of 7000 feet. Above 10,000 feet his Swahili porters could not sleep without injury to their health, and it was only with a reduced number of men that he was able to ascend another 3000 feet. Amongst the animals specially mentioned was a species of water buck (*Cobus*), a new chameleon, a new snake, and several new insects.—The Secretary then read an abstract of a paper by Dr. Maxwell T. Masters, on the genus *Cupressus*, illustrated by a number of plants and cuttings which had been forwarded by Messrs. Veitch, Mr. Moore, of Glasnevin, and Dr. Acton, of Kilmacurragh.—Dealing with the zoological collections made during the recent expedition of Mr. Theodore Bent to Southern Arabia, Messrs. Kirby, Gahan, and Pocock presented papers on the insects and arachnida which had been obtained, some of which were described as new.

Royal Meteorological Society, March 20.—Mr. W. N. Shaw, F.R.S., delivered a lecture on "The Motion of Clouds considered with reference to their mode of formation," which was illustrated by experiments. The question proposed for consideration was how far the apparent motion of cloud was a satisfactory indication of the motion of the air in which the cloud is formed. The mountain cloud cap was cited as an instance of a stationary cloud formed in air moving sometimes with great rapidity; ground fog, thunderclouds, and cumulus clouds were also referred to in this connection. The two causes of formation of cloud were next considered, viz. (1) the mixing of masses of air at different temperatures, and (2) the dynamical cooling of air by the reduction of its pressure without supplying heat from the outside. The two methods of formation were illustrated by experiments. A sketch of the supposed motion of air near the centre of a cyclone showed the probability of the clouds formed by the mixing of air being carried along with the air after they were formed, while when cloud is being formed by expansion circumstances connected with the formation of drops of water on the nuclei to be found in the air, and the maintenance of the particles in a state of suspension, make it probable that the apparent motion of such a cloud is a bad indicator of the motion of the air. After describing some special cases, Mr. Shaw referred to the meteorological effects of the thermal disturbance which must be introduced by the condensation of water vapour, and he attributed the violent atmospheric disturbances accompanying tropical rains to this cause. The difference in the character of nuclei for the deposit of water drops was also pointed out and illustrated by the exhibition of coloured halos formed under special conditions when the drops were sufficiently uniform in size.

PARIS.

Academy of Sciences, March 18.—M. Marey in the chair.—Attempts to produce chemical combinations with argon, by M. Berthelot. Argon has been submitted to the action of the silent discharge under the conditions described in the author's "Essai de Mécanique chimique," t. ii., pp. 362–363. The apparatus used was that described in the "Annales de Chimie et de Physique" [5], x., pp. 79, 76, and 77. With benzene vapour, argon is absorbed though more slowly than nitrogen. 87 per cent. of the volume of argon employed in the experiment entered into combination. As the total volume of argon at disposal was but 37 c.c., the products were too small in quantity to allow of any extended investigation into their nature. They appear to be similar in character to the products obtained with nitrogen and benzene. A yellow, resinous, odorous substance condensed on the surface of the two glass tubes; this substance decomposed on heating, yielding an abundant carbonaceous residue and volatile products which reddened litmus paper.—On the lacunæ in the zone of small planets, by M. O. Callandreau.—Transformations of fibrin by

the prolonged action of dilute saline solutions, by M. A. Dastre.—On the variations of terrestrial latitudes, by M. F. Gonnessiat.—On the theory of a system of differential equations, by M. A. J. Stodolkievitz.—On a general definition of friction, by M. Paul Painlevé.—On Fourier's problem, by M. Le Roy.—Absorption of light in uniaxial crystals, by M. G. Moreau. The symmetry of uniaxial absorption is not so complete as the theory of the ellipsoid of absorption indicates. The dissymmetry is greater as the crystal is more birefringent.—On the potential of an electrified surface, by M. Jules Andrade.—Apparatus imitating the movements executed by certain animals in turning round without external fulcra, by M. Edm. Fouché. The explanation of the movements of a cat, enabling it to always fall on its feet, given by M. Guyou, is completely borne out by the successful reproduction of the rotatory movement with a strictly mechanical model.—The catoptric and symmetrical objective, by M. Ch. V. Zenger.—On a class of secondary batteries, by M. Lucien Poincaré. The author describes a secondary battery with mercury for poles and sodium iodide in concentrated solution for electrolyte. The mercury iodide formed remains in solution, and the sodium forms an amalgam with the mercury. On discharge the yield is more than 90 per cent. of the theoretical. The battery is not affected by short circuiting or the particular manner of its discharge, but is unlikely to be practically used on account of the expensive nature of the materials, and the necessity of removing the amalgam from contact with the liquid if the battery is to remain long charged.—On the effect of an alternating electromotive force on the capillary electrometer, by M. Bernard Brunhes.—Thermochemical carbon battery, by M. Désiré Korda. By the action of carbon on barium peroxide during the reduction of the latter to monoxide, an E.M.F. of nearly 1 volt is produced when arranged as a cell. In the case given an internal resistance of 13·6 ohms was found. A similar arrangement with copper peroxide, the latter being separated from the carbon pole by dry, pure potassium carbonate, gave 1·1 volt with an internal resistance of 3·2 ohms.—Action of nitrous oxide on metals and metallic oxides, by MM. Paul Sabatier and J. B. Senderens. A table is given showing the comparative reactions of N_2O, NO, and NO_2, and air on a series of metals and oxides. The deduction is drawn that oxidations by means of N_2O are caused by the direct action of this gas without preliminary decomposition into its constituents.—Researches on the heats of combination of mercury with the elements, by M. Raoul Varet.—On the isomeric states of the oxides of mercury, by M. Raoul Varet. It is shown that yellow and red oxides dissolve in dilute HCN with liberation of the same amount of heat, and hence the transformation of yellow into red oxide gives no appreciable thermal effect.—On the heat of formation of some compounds of iron, by M. H. Le Chatelier.—On the chlor-aldehydes, by M. Paul Rivals. A thermochemical paper.—On a mercuric combination of thiophene, permitting the estimation of the latter in commercial benzene and its extraction therefrom, by M. G. Denigès. A very stable combination of mercury and thiophene, having the composition $(SO_4Hg.HgO)_2SC_4H_4.H_2O$, is obtained by treatment of thiophene with an acid solution of mercuric sulphate (made by dissolving fifty grams of mercuric oxide in 200 c.c. of pure sulphuric acid diluted with a litre of distilled water). On account of its insolubility and ease of formation, this compound may be used for the detection of traces of thiophene in benzene and for the purification of benzene.—On the amorphous state of melted substances, by M. C. Tanret.—Derivatives of active α-hydroxybutyric acid, by MM. Ph. A. Guye and Ch. Jordan. A paper giving optical rotations and products of asymmetry.—The production of wine and the utilisation of fertilising principles by the vine, by M. A. Muntz.—On the decortication of wheat, by M. Balland.—On the parts taken respectively by purely physical and by physiological actions in the disengagement of carbonic acid by muscles isolated from the body, by M. J. Tissot.—Therapeutic action of currents of high frequency (autoconduction of M. d'Arsonval), by MM. Apostoli and Berlioz. These currents have a powerful influence on the nutritive activity of the tissues, and hence are of first importance in the treatment of many functional troubles, caused by defective nutrition.—New application of the graphic method to music, by MM. A. Binet and J. Courtier.—Histological researches on the development of the Mucorini, by M. Maurice Léger.—On the geology of Ossola (*Alpes Lépontines*), by M. S. Traverso.—On an application of photography to oceanography, by M. J. Thoulet.

BOOKS, PAMPHLETS, and SERIALS RECEIVED

BOOKS.—Bird Notes: late J. M. Hayward (Longmans).—Statesman's Year-Book, 1895 (Macmillan).—Qualitative Chemical Analysis of Inorganic Substances (American Book Company, New York).—Annals of British Geology, 1893: J. F. Blake (Dulau).—A Handbook of Systematic Botany: Dr. E. Warming, translated and edited by Prof. M. C. Potter (Sonnenschein).—Illustrations of the Zoology of H.M. Indian Marine Surveying Steamer *Investigator*, Part 1 (Quaritch).—Stanford's Compendium of Geography and Travel (new issue)—Africa, Vol. 1: North Africa: A. H. Keane (Stanford).—Hygienische Meteorologie: Prof. Dr. W. J. van Bebber (Stuttgart, Enke).—Text-Book of Anatomy and Physiology for Nurses: D. C. Kimber (Macmillan).—Chemical Analysis of Oils, Fats, Waxes, &c.: Dr. R. Benedikt, revised and enlarged by Dr. J. Lewkowitsch (Macmillan). Taschenbuch für Flugtechniker und Luftschiffer: H. W. L. Moedebeck, (Berlin, Kühl).—Le Pétrole, L'Asphalte et le Bitume: A. Jaccard (Paris, Alcan).

PAMPHLETS.—Madras Government Museum, Bulletin No. 3: Rámévaram Island and Fauna of the Gulf of Manaar: E. Thurston, 2nd edition (Madras).—Die Entwickelung: Dr. G. Pfeffer (Berlin, Friedländer).

SERIALS.—Royal Natural History, Part 17 (Warne).—Proceedings of the Royal Society of Victoria, Vol. vii. new series (Melbourne).—American Naturalist, March (Philadelphia).—Astrophysical Journal, March (Chicago).—Journal of the Institution of Electrical Engineers, No. 115, Vol. xxiv. (Spon).—Economic Journal, March (Macmillan).—Botanische Jahrbucher, Neunzehnter Band, v. Heft (Leipzig, Engelmann).—Transactions of the Astronomical and Physical Society of Toronto for the Year 1894 (Toronto, Rowsell).—Zeitschrift für Physikalische Chemie, xvi. Band, 3 Heft (Leipzig, Engelmann).—Minnesota Botanical Studies, Bulletin No. 9 (Minneapolis).—Notes from the Leyden Museum, Vol. xvi. Nos. 3 and 4 (Leyden, Brill).—Good Words, April (Isbister).—Sunday Magazine, April (Isbister).—Longman's Magazine, April (Longmans).—Quarterly Journal of Microscopical Science, No. 147 (Churchill).—Bulletin of the Geographical Club of Philadelphia, Vol. i, No. 3 (Philadelphia).—Bulletin of the U.S. Geological Survey, No. 120 (Washington).

CONTENTS.