to chemical actions taking place in any substance, heat which has been unable to escape has raised the temperature to the point of ignition, a point at which slow combustion passes into rapid combustion with manifestation of incandescence; and in speaking of spontaneous combustion, we must clearly remember that it represents merely the acceleration of an action which has been going on slowly and surely, although our senses may have been too deadened to detect it, and that if we wished to be hypercritical, "Unaided Ignition," or "Natural Ignition," would be a far more correct term to apply to it than "Spontaneous Combustion."

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The following appointments in connection with the scientific departments are announced:—Mr. Francis Darwin, Reader in Botany, to be Deputy Professor in the place of Prof. Babington, who is still unable to lecture; Dr. D. MacAlister to be Assessor to the Regius Professor of Physics; Dr. Hill, Master of Downing, and Dr. H. D. Rolleston to be Examiners in Anatomy; Dr. A. S. Lea and Prof. Schäfer to be Examiners in Physiology; Dr. W. J. Sollas and Mr. P. Lake (St. John's) to be Examiners in Geology; Mr. Skinner (Christ's) to be an Examiner in Chemistry; Prof. J. J. Thomson and Prof. G. F. Fitzgerald (of Dublin) to be Examiners in Physics; Mr. A. Sedgwick (Trinity) and Mr. W. Bateson (St. John's) to be Examiners in Zoology; Prof. Lewis and Mr. H. A. Miers to be Examiners in Mineralogy; Mr. Seward (St. John's) and Prof. D. E. Oliver to be Examiners in Botany.

Prof. Sir R. S. Ball has been appointed an Elector to the Isaac Newton Astronomy Studentships.

The Moderators and Examiners for the next Mathematical Tripos (Part I.) are Mr. Walsh (Jesus), Mr. Dawson (Christ's), Mr. Burnside (Pembroke), and Mr. Whitehead (Trinity). For the Second Part, Dr. Forsyth, Sir R. S. Ball, Prof. Lamb, and Mr. H. F. Baker (St. John's) are to examine.

Mrs. E. J. Moore, daughter of the late Colonel Fletcher, has presented to the University her father's valuable collection of Silurian fossils, in supplement of the Fletcher collection purchased many years ago for the Woodwardian Museum.

The Clerk Maxwell Studentship in Experimental Physics, of the value of about £180 a year, tenable for three years, is vacant by the resignation of Mr. W. Cassie, who has been appointed to a professorship at the Royal Holloway College. Candidates must be members of the University who have been a student for one term or more at the Cavendish Laboratory. The names of applicants are to be sent to Prof. J. J. Thomson before November 18.

A grant of £100 from the Worts Travelling Scholars Fund has been made to F. W. Keeble, Frank Smart student of Caius College, to enable him to pursue botanical research in Ceylon.

An examination for scholarships and exhibitions in Natural Science, of the value of £80 a year and under, will be held at Trinity College on Tuesday, October 31.

AT the annual meeting of the New Decimal Association, on October 18, Mr. Samuel Montagu, M.P., remarked that there was a prospect of the United States adopting the metric system as well as a decimal system of coinage. Efforts had been made to induce Mr. Acland to instruct inspectors to examine in the metric system in those schools where it was taught, and, in a letter received from the Education Department on the subject, it was said: "The Code does not prescribe knowledge of the metric system, but of the principles of that system—*i.e.* of the diminution of quantities by tenths, and their increase by tens, with examples sufficient to illustrate the conveniences of the system. Her Majesty's inspectors are required to satisfy themselves that the principles as thus defined are properly taught. It is proposed to issue a memorandum to inspectors on the point at an early date."

SCIENTIFIC SERIALS.

American Journal of Science, October.—On endothermic reactions effected by mechanical force, by M. Carey Lea. The object of this investigation was to find whether the blackening effects of pressure upon the silver haloids and other salts could be made immediately visible to the eye, instead of after the application of a reducing agent. For this purpose the pressure was increased to about a million pounds per square inch, or about seventy thousand atmospheres. This pressure was obtained by means of a vice actuated by a screw with six turns to the inch and a lever three feet long. The nuts had to be four inches in length to prevent stripping of the thread. The jaws were specially constructed, and faced with steel welded on. The materials experimented upon were wrapped in platinum or silver foil, which remained unaffected by the pressure. Silver sulphite and carbonate were moderately darkened by two days' pressure, and silver salicylate considerably so. Salts of mercury also showed pronounced effects, which prove that mechanical force can bring about endothermic reactions corresponding to those affected by light, heat, and other forms of energy.—Conditions of Appalachian faulting, by Bailey Willis and C. Willard Hayes. The authors discuss the antecedent conditions for the development, the mechanics of step-folds and thrust-faults as bearing upon actually observed Appalachian structure, and the direction from which the compressing force acted. They come to the conclusion that the latter was equal in opposite directions, and directed north-westward and south-eastward.—On the separation of copper from cadmium by the iodide method, by Philipp E. Browning. The copper was precipitated from a mixed solution by potassium iodide, and filtered through an asbestos felt, washed, dried at 120° C. and weighed. The filtrate and washings containing the cadmium were heated to boiling, and sufficient sodium carbonate was added to complete the precipitation. The precipitate was washed with hot water until free from sulphate or iodide. The crucible containing the cadmium carbonate was heated gently at first, then gradually to a higher degree until the white carbonate had changed to the brown oxide. The method, as tested by means of standard solutions, is fairly accurate, and it is simple in manipulation.—Also papers by Messrs. Foerste, Hidden, Wheeler, Eakins, Williams, Penfield, and Marsh.

THE *American Meteorological Journal* for October contains an account, by A. L. Rotch, of the establishment of a meteorological station at Charchani, near Arequipa, at an altitude of 16,650 feet, which is said to be the highest station in the world. A sum of money was left to Harvard College Observatory by U. A. Boyden, for the purpose of establishing an observatory at a high station, and owing to the remarkable clearness of the air at Arequipa, Peru, this situation was selected for the purpose. The establishment is fully equipped with instruments and is 8,050 feet above the sea; to the north east and ten miles distant is the quiescent volcano of the Misti, 19,000 feet in altitude, and twelve miles north rises Charchani, 20,000 feet high. The meteorological station now in question has been established just below the permanent snow line, and is supplied with self-recording aneroid and thermometers. The ascent from the permanent observatory, 8,600 feet below, can be made by mule in about eight hours, and an assistant is entrusted with the duty of visiting the station periodically to attend to the records. The results of the observations at both stations will be published in the Annals of the Harvard College Observatory, and will furnish a valuable addition to our knowledge of mountain meteorology.

In the same number, Prof. G. E. Curtis gives an analysis of the causes of rainfall, with especial relations to surface conditions. Among these a principal question is whether forestation increases and deforestation decreases the rainfall. The author considers that the influence of forests has been over-estimated, and that if they affect the rainfall, the amount has, in most cases, not been greater than the amount of probable error in the observations themselves, and therefore that the statistics give no assurance that the effect is not an error of observation. If the rainfall is increased it must be due either to an increase of evaporation, and its subsequent precipitation over the same region, or to the diversion of rain to the forest area, which might have fallen elsewhere.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, October 16.—M. Lœwy in the chair.—On the stability of equilibrium of the axis of the gyroscopic top, by M. H. Resal.—On the partial differential equation presented in the theory of the vibrations

of a membrane, by Énile Picard.—On the crystallisation of water by decompression below zero, by M. E. H. Amagat. The experiments were performed with the apparatus provided with glass sights used for studying the solidification of liquids under pressure. But the conical sights mounted in ivory were apt to split into plates, and lose their transparency under high pressures. Cylindrical pieces mounted with marine glue were substituted, some of which resisted pressures up to 1800 atmospheres. The water enclosed in the steel cylinder was first solidified and maintained at a temperature below zero. By gradually raising the pressure, the ice was fused and made to disappear completely. On diminishing the pressure, crystals were deposited on the inner surface of the glass, just as in the case of bodies denser in the solid state when the pressure was raised. The phenomenon is, however, rather more difficult to produce. The solidification was especially retarded when care was taken to fuse all the crystals by pressure, but even when a few fragments were left no such beautiful crystals were obtained as in the case of chloride of carbon. It would be extremely interesting to follow up, for a certain number of liquids, the variation of the point of fusion under very high pressures; as the ratio of the coefficients of compressibility of water and of ice is unknown, it may be asked whether under sufficient pressures the density of ice does not exceed that of water, thus giving rise to a point of inversion which would assimilate the behaviour of water to that of other liquids, or whether other liquids show such a point of inversion in the opposite sense. This would explain certain appearances observed in the case of chloride of carbon.—On an extension of Riemann's method applied to equations of the second order to equations of any order, by M. Delassus.—On the third principle of energetics, by M. H. Le Chatelier. This is a reply to M. Meyerhoffer's criticism, and shows that the term capacity for energy is differently defined by the two authors. Thermodynamic theory is based upon two experimental principles and an hypothesis concerning the nature of heat. The latter may be eliminated by substituting for it the experimental principle which can be expressed as follows: It is impossible to extract energy from a system of bodies without making two at least of its constituents experience changes of opposite sense. From this the proportionality of work performed and heat consumed or generated is easily deduced. It is this proportionality which enables us to reduce the number of algebraic equations to two, sufficient to represent three distinct experimental principles.—On the electric conveyance of heat, by M. L. Houllevigue. The difference of potential between a conductor and iron is different accordingly as the iron is magnetised or not. One joint of a copper-iron couple was brought into a magnetic field, and the other left out. Since this arrangement could not give rise to a steady current without creating energy, an opposing electromotive force was to be expected between the variously magnetised parts of the iron. Such a difference of potential was, in fact, found, the balance being in favour of the less magnetised portions.—On some properties of the oxides of lead, by M. A. Bonnet.—On the interior temperature of bread coming out of the oven, by M. Balland. Experiments performed on various kinds of bread from different ovens show that the temperature of the crumb during baking reaches 100° or 102°, that of the crust being much higher. When beyond 100° the steam imprisoned by the crust is under a certain pressure. If this pressure is relaxed by the bursting of the crust, the temperature of the interior falls to 100°.—Observations of the phenomena of karyokinesis in the blastoderm cellules of the teleostea, by MM. E. Bataillon and R. Kœhler.—On the germination of the Ricinus, by M. Leclerc du Sablon.—A new enemy of the vine, *Blanyulus guttulatus*, Fabr., by M. Fontaine. This is a myriapod which invades the buds in numbers, ranging from five to ten per bud, forming balls of the size of a small pea. Washing with potassium sulphocarbonate and sulphuring the soil are remedies proposed.—On some phenomena relating to the movement of the sea near Bonifacio, by M. Nicol.

DIARY OF SOCIETIES.

LONDON.

THURSDAY, OCTOBER 26.

INSTITUTION OF MECHANICAL ENGINEERS, at 7.30.—On the Working of Steam Pumps on the Russian South-Western Railways: Alexander Borodin.

FRIDAY, OCTOBER 27.

PHYSICAL SOCIETY, at 5.—On Air-Core Transformers: E. C. Rimington.—Two Experiments on the Rings and Brushes in Crystals, and Electrical Radiation in Copper Filings: W. B. Croft.

SUNDAY, OCTOBER 29.

SUNDAY LECTURE SOCIETY, at 4.—Savages and Barbarians: a Sketch of their Institutions and their Growth from Savagery to Barbarism: Prince Kropotkin.

THURSDAY, NOVEMBER 2.

LINNEAN SOCIETY, at 8.—A Contribution to the Phanerogamic Flora of Mato Grosso and the Northern Chaco: Spencer Le Marchant Moore.—On a New Freshwater Schizopod from Tasmania: G. N. Thomson.

FRIDAY, NOVEMBER 3.

GEOLOGISTS' ASSOCIATION, at 8.—*Conversazione.*

BOOKS RECEIVED.

BOOKS.—Plane Trigonometry: S. L. Loney (Camb. Univ. Press).—The Mummy: Dr. E. A. W. Budge (Camb. Univ. Press).—With the Woodlanders and by the Tide: a Son of the Marshes (Blackwood).—Romance of Low Life amongst Plants: Dr. M. C. Cooke (S.P.C.K.).—Eleventh Annual Report of the U.S. Geological Survey, Part i.: Geology.—Eleventh Annual Report of the U.S. Geological Survey, Part ii.: Irrigation: J. W. Powell (Washington).—Measurement of Light and Colour-Sensations: J. W. Lovibond (G. Ll).—Results of Astronomical Observations made at Sydney Observatory, N.S.W. in the years 1879, 1880, and 1881: H. C. Russell (Sydney, Potter)—Horns and Hoofs, or Chapters on Hoofed Animals: R. Lyddeker (H. Cox).—The Municipal Technical School and School of Art, Manchester, Session 1893-94, Syllabus (Manchester).—Round the Works of our Principal Railways (Arnold).

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