

responding theorems for definite integrals. References to other memoirs abound.—Mr. C. L. Bouton gives an account of a game which he entitles "Nim" (a game with a complete mathematical theory). It is a game played at a number of American colleges and fairs and has been called "Fan-tan," though it does not correspond with the Chinese game of that name. He gives a description of the game (too curt, we think), and also discusses the theory of it.—Dr. G. A. Miller discusses the groups generated by two operators of order three whose product is also of order three, a short note, as is also the concluding one, on the invariants of a quadrangle under the largest subgroup, having a fixed point, of the general projective group in the plane, by W. A. Granville.

American Journal of Science, January.—An experimental investigation into the "skin" effect in electrical oscillators, by C. A. Chant. The skin effect was studied on sixteen cylindrical oscillators of various materials, including brass, iron, copper, gold, tin and silver, and of thicknesses varying from 0.000114 cm. upwards. The expected effect was not realised, as in the case of both the cylindrical and spherical oscillators the excessively thin gold shells were quite as efficient as the solid metal bodies.—The effect of hydrochloric acid upon the precipitation of cuprous sulphocyanide, by R. G. Van Name. In the presence of free hydrochloric acid the precipitation of copper sulphocyanide by a small excess of ammonium sulphocyanide is incomplete. The error can be reduced to a negligible amount by increasing the amount of the ammonium sulphocyanide.—The action of ammonium chloride upon certain silicates, by F. W. Clarke and G. Steiger. The minerals submitted to the action of the ammonium salt included stilbite, heulandite, chabazite, thomsonite, ilvaite, riebeckite, aegirite, serpentine, leuchtenbergite and phlogopite.—Studies of Eocene Mammalia in the Marsh collection, Peabody Museum, by J. L. Wortman. The present instalment deals with *Mesonyx obtusidens*.—A cosmic cycle, by F. L. Very.

SOCIETIES AND ACADEMIES.

MANCHESTER.

Literary and Philosophical Society, January 7.—Mr. Charles Bailey, president, in the chair.—The president announced that the Society was indebted to Dr. Edward Schunck, F.R.S., for a mural tablet, placed in the secretaries' room, bearing the following inscription: "This room was the laboratory of John Dalton; here his great discoveries were made, and here he conceived and worked out his atomic theory."—Mr. J. Cosmo Melvill exhibited many species of the genus *Chrysanthemum*, L., and described its affinities and subdivisions. He directed special attention to wild examples of *C. sinense* from China and *C. indicum* from both China and Japan, these two species being the origins of all the garden varieties, the former of the long-petalled kinds and the latter of the short-rayed and pom-pom forms.—Mr. R. S. Hutton described experiments which he had carried out at the Owens College on the fusion of quartz by means of the electric arc. He finds that, with suitable arrangement, there is no inconvenience caused by the reducing action of the arc, and that, owing to the much higher temperature, the fusion takes place with greater rapidity than with the oxy-hydrogen blowpipe. Methods were described for making tubes of quartz of any desired length in an electric arc furnace, and specimens of tubes were shown.—Dr. George Wilson read a paper on the failure of certain cast-steel dies used in the manufacture of drawn tubes. During the process of manufacturing tubes, the dies have occasionally fractured, to the danger of those using them, and an attempt has therefore been made to estimate some of the stresses to which such dies may be subjected. The results show that out of six fractured dies of which particulars were obtained, five had a factor of safety too small to cover flaws and dynamic effects. An example of the stress in a die is fully worked out, showing by curve the nature of the stresses and distortions.—Mr. C. E. Stromeier exhibited some chemical gas washers which he had designed for dealing with relatively large volumes of gas. The largest apparatus was capable of dealing with about 50 litres per hour, and one of the smaller ones, designed to hold only six cubic centimetres of fluid and weighing only 40 grammes, was able to deal with 5 litres per hour.

PARIS.

Academy of Sciences, January 6.—M. Bouquet de la Grye in the chair.—On the focussing of a collimator or a telescope by means of the measurement of a parallax, by M. G. Lippmann. A point P at a finite distance from the collimator is viewed through an auxiliary telescope and brought on to the cross-wire of its eyepiece. The auxiliary telescope is now displaced parallel to itself through a known distance; if the image of P still remains on the cross-wire the collimator is correctly adjusted for parallel rays. If not, the collimator is adjusted until this condition is satisfied. The sensibility of the method depends on the magnifying power of the auxiliary telescope, and increases rapidly with the dimensions of the latter.—A method for verifying if a slider or a rule is rectilinear, by M. G. Lippmann.—The preparation and properties of potassium hydride, by M. Henri Moissan. The existence of a hydride of potassium has been known for some time; in the present paper an account is given of the difficulties encountered in the preparation of this body in a pure state. Hydrogen acts very slowly at a temperature of 360° C. upon potassium, giving a white crystalline hydride of the formula KH. This is instantly decomposed by water, takes fire at the ordinary temperature in fluorine, chlorine and in dry oxygen. It possesses very energetic reducing properties, comparable to those of calcium hydride.—On a tumour of the tendon of Achilles, by M. Lannelongue. The changes in this tumour, which was not malignant, were followed by radiography. It was cured without treatment in two years, and as an operation was not necessary its exact nature remained doubtful.—The stability of a system, for any perturbations, affected by a movement of uniform rotation, by M. P. Duhem.—On the geographical position of In-Salah, an oasis of the Touatian archipelago in the Central Sahara, by M. G. B. M. Flamand. The latitude and longitude of this point, about which there has been some controversy, as well as of five other points, were redetermined by the Tidikelt expedition.—On certain systems of total differential linear equations, by M. Émile Cotton.—On the universal vibrations of matter, by M. A. Korn.—On the electrostatic field round an electric current, and on a theorem by Poynting, by M. W. de Nicolaïève. An experimental study the results of which are in exact accord with Poynting's theorem.—The general equations of electrodynamics in conductors and perfect dielectrics at rest, by M. E. Carvallo. An analytical expression and a dynamical interpretation for the two general laws of electrodynamics given in a previous paper is here deduced and the results compared with those of Maxwell.—A new method for the measurement and recording of high temperatures, by M. André Job. An application of the fact that the viscosity of a gas varies rapidly with the temperature. Oxygen gas is evolved at a constant rate from a voltmeter and allowed to escape alternately through two capillary tubes, one of which is at a known temperature and the other at the high temperature to be measured. The pressure under which the gas escapes in each case is measured with a manometer, and by a direct comparison with a Le Chatelier couple it was found that the ratio of the excess of pressure in the two cases is a linear function of the temperature.—On the absolute value of the magnetic elements on January 1, 1902, by M. Th. Moureaux. The values given are for the observatory of Val-Joyeux.—The action of copper hydrate upon aqueous solutions of metallic salts, by M. A. Mailhe. The salts studied were the sulphates of cadmium, nickel, cobalt, zinc, manganese, mercury, aluminium and iron.—On the condensation of hydrocarbons of the acetylene series with esters. The synthesis of acetylenic acetones and β -ketonic ethers, by MM. Ch. Moureu and R. Delange. The reaction between the sodium derivatives of α -naphthyl-acetylene and phenyl-acetylene with ten alkyl esters has been studied. The reaction takes place in two ways; in some cases the acyl derivative $R-CO-C\equiv C-R'$ is produced, which can be hydrolysed to the β -diketone $R-CO-CH_2-CO-R'$, in others the β -ketonic ester is obtained directly.—The utilisation of hexoses by the organism, by MM. Charrin and Brocard. From the point of view of utilisation by the organism, *lævulose* occupies the first place, *galactose* the second and *glycose* the third.—The presence of a parasite in the blood of epileptics, by M. M. Bra. Three microphotographs of the blood in epileptic patients under different conditions are given. The results appear to show that a microorganism is always present at the approach of and during the attack. This organism is a streptococcus, which would appear to have special morphological

and biological characteristics.—Contribution to the study of phosphorus as a plant food, by M. Th. Schloësing, jun.—New observations on the evolution and origin of Peripatus, by M. E. L. Bouvier.—On the orientation of the Crinorhiza, by M. E. Topsent.—On the discovery of a nummulitic layer in a boring executed at St. Louis, Senegal, by M. G. Vasseur. From these observations the conclusion is drawn that towards the end of the lower Eocene period the sea, forming a vast gulf in the eastern portion of the Lybian desert and in the Arabian desert, and covering a part of Algeria, bent round to the north-west of the African continent and followed at a distance the line of the Atlantic coast, reaching on the south the basin of St. Louis.—Comparison of the Cretaceous basins of Eaux-Chaudes, Gèdre and Gavarnie, by M. A. Bresson.

ST. LOUIS.

Academy of Science, December 16, 1901.—A paper by Messrs. K. K. MacKenzie and B. F. Bush, entitled "The Lespedezas of Missouri," was presented by title.—Prof. F. L. Soldan delivered an address on the advance made in education during the nineteenth century, stating that the most characteristic feature of the century's progress lay in the epoch of expansion and organisation which it marked. The influence of Pestalozzi, Froebel, Horace Mann, William T. Harris and other distinguished educators was traced, the marked change in opinion concerning the commercial value of education brought out by the Centennial Exposition of 1876 was indicated, and the establishment of a true University grade in the United States with the opening of the Johns Hopkins University, the year following, was commented on.—Prof. F. E. Nipher stated that he had continued his experiments on the production of ether disturbances by explosions, and by the motion of masses of matter. He had apparently succeeded in eliminating the effects of the shock of the air-wave upon the magnet-needle. The needle is adjusted to a condition approaching maximum sensitiveness. There is no iron about the apparatus, except what is contained in the needle and in the compensating magnets. The latter are clamped in place so that the structure on which they are mounted may be pounded by a mallet without disturbing the needle. Rowland effects due to convection of electrified particles have also been eliminated. There remains a marked deflection of the needle, seeming to indicate that an ether distortion or wave originates in a sharp or violent explosion. This result is so amazing that it is announced with the statement that the whole subject is yet under the most searching examination. The coherer and the receiver of the telephone are to be used in two wholly different plans of experiment, in one of which the effects along the entire track of a leaden bullet are to be summed up in an alternating current. The results which seem to have been reached are in entire harmony with the well-known experiment of Michelson and Morley, who found that the ether within the building in which they worked was being carried along with the building and with the earth in its orbital motion.

DIARY OF SOCIETIES.

THURSDAY, JANUARY 16.

LINNEAN SOCIETY, at 8.—On the Use of Linnean Specific Names: H. and J. Groves.—Exhibitions: Branches of Cherry affected by the Gnomonia Disease, with Remarks on its Effects and Climatic Causes: A. O. Walker.—Photographs and Specimens of Heads of Wild Sheep, to illustrate a recent Suggestion as to the Use of Large Horns in Feral Species: J. E. Harting.

CHEMICAL SOCIETY, at 8.—Myricetin, Part II.: A. G. Perkin.—The Colouring Matters of Green Ebony: A. G. Perkin and S. H. C. Briggs.—An Investigation of the Radioactive Emanation produced by Thorium Compounds, I.: E. Rutherford and F. Soddy.

FRIDAY, JANUARY 17.

ROYAL INSTITUTION, at 9.—Interference of Sound: Lord Rayleigh.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Theory of Heat-Engines: Captain H. Riall Sankey.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Modern Machine Methods: H. F. L. Orcutt.

EPIDEMIOLOGICAL SOCIETY, at 8.30.—Dysentery in Asylums: Dr. Mott, F.R.S.—The Relation of the Dysentery of Asylums to that of South Africa: Dr. Washbourn, C.M.G.

MONDAY, JANUARY 20.

SOCIETY OF ARTS, at 8.—The Purification and Sterilisation of Water: Dr. Samuel Rideal.

TUESDAY, JANUARY 21.

ROYAL INSTITUTION, at 3.—The Cell: its Means of Offence and Defence: Prof. A. Macfadyen.

SOCIETY OF ARTS, at 8.—The Architect's Use of Enamelled Tiles: Halsey Ricardo.

ROYAL STATISTICAL SOCIETY, at 5.—Tonnage Statistics of the Decade 1891-1900: Sir John Glover.

ANTHROPOLOGICAL INSTITUTE, at 8.30.—On some Rude Stone Monuments in Yorkshire: A. L. Lewis.—On a Group of Cairns with Megalithic Cists in the West of Scotland, and the Human Remains associated therewith: Dr. T. H. Bryce.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Paper to be further discussed: American Workshop Methods in Steel Construction: H. B. Molesworth.

WEDNESDAY, JANUARY 22.

SOCIETY OF ARTS, at 8.—Scientific Observations at High Altitudes: Rev. J. M. Bacon.

GEOLOGICAL SOCIETY, at 8.—The Fossiliferous Silurian Beds and Associated Igneous Rocks of the Clogher Head District (Co. Kerry): Prof. S. H. Reynolds and C. I. Gardiner.—A Process for the Mineral Analysis of Rocks: Prof. W. J. Sollas, F.R.S.

THURSDAY, JANUARY 23.

ROYAL SOCIETY, at 4.30.—Probable Papers: (1) Mathematical Contributions to the Theory of Evolution. XI. On the Influence of Natural Selection on the Variability and Correlation of Organs; (2) On the Correlation of Intellectual Ability with the Size and Shape of the Head. Preliminary Notice: Prof. K. Pearson, F.R.S.—A Short Description of the Culicidæ of India, with Descriptions of New Species of Anopheles: F. V. Theobald.—The Affinity of Tmesipteris with the Sphenophyllales: Prof. A. P. W. Thomas.—On the Excretory Organs of Amphioxus: E. S. Goodrich.

ROYAL INSTITUTION, at 3.—Recent Excavations at Delphi and in the Greek Islands: Dr. A. S. Murray.

SOCIETY OF ARTS, at 4.30.—Bengal: the Land and its People: F. H. Skrine.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Earth Currents derived from Distributing Systems: E. B. Wedmore.

FRIDAY, JANUARY 24.

ROYAL INSTITUTION, at 9.—The Discovery of the Future: H. G. Wells.

PHYSICAL SOCIETY, at 5.—The Facts of Heat. Part I.: James Swinburne.—Exhibition of some Twinned Crystals of Selenite: Eustace Large.

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