the debt—7500*l.*—in order that the debt of the College may be extinguished altogether.

AT a special meeting of the Court of the Victoria University, the recent movements to establish separate Universities in Liverpool, Manchester and Leeds were discussed. As the University College, Liverpool ; Owens College, Manchester ; and the Yorkshire College are the three constituent colleges of the Victoria University, the establishment of the three proposed Universities would mean the disruption of the present federated University. The two alternatives which the Court had to consider were as follows :—" Having regard to the resolutions of the three constituent colleges of the University, the question for decision must be whether (*a*) the three colleges are to remain as constituent colleges of the University ; or whether (*b*) there should be a separate University in Liverpool and a ' University in Manchester without liability to admit or to remain in association with any other college,' and also a ' University established having its seat in Leeds.' " The latter view was accepted, and a committee was appointed to consider the terms and conditions on which it should be carried into effect.

THE New York correspondent of the *Morning Leader* says that the gifts to education in the United States in 1901 amount to more than 15,000,000*l.* Of this sum 9,000,000*l.* was contributed by three individuals. Mrs. Leland Sanford gave the magnificent sum of 6,000,000*l.* to the western University which bears her husband's name. Mr. John D. Rockefeller made an endowment of 1,000,000*l.* for the law school in the University of Chicago, and Mr. Andrew Carnegie has given 2,000,000*l.* to found an institution for scientific research at Washington. Mrs. Leland Sanford's gift of 6,000,000*l.* was in real estate and bonds and stocks. In making her gift Mrs. Sanford was actuated by the example of many wealthy persons in making bequests before their death in order to avoid possible will contests which might tie up the property for years. Mr. Carnegie's gift to endow research provides the United States with a fund which, wisely administered, will greatly strengthen university work in America and give an impetus to investigation which will have a profound influence upon the progress of the country.

THAT there is a widespread desire to modify the traditional methods of teaching the subjects of the ordinary secondary school curriculum and to bring them more into harmony with the practical needs of present everyday life, is strikingly shown by the frequent discussions on the desirability of reform in the teaching of mathematics which have taken place in the last few months. One of the most recent of such discussions was that which followed an address by Mr. W. C. Fletcher, headmaster of Liverpool Institute, at the meeting of the Incorporated Association of Headmasters held in London last week. Mr. Fletcher moved the following resolution, which was eventually adopted : " That this Association desires to press upon the universities and other examining bodies the desirability of greater elasticity in their regulations as to mathematical teaching, and is of opinion that to insist upon adherence to the order of propositions in Euclid is mischievous." Mr. Fletcher said that six years' experience of teaching geometry has led him to believe that Euclid is a great hindrance to ninety-nine boys out of every hundred in training and knowledge. A great deal of damage is done by insistence, not only upon the particular method, but on the particular order, of Euclid. As the result of his experience he had re-written the first half of Euclid's first book, omitted the second book, and introduced two or three propositions about proportion, in this way forming an interesting, sound and coherent plan. The headmasters were so impressed with the value of Mr. Fletcher's remarks that they decided to have his speech printed and circulated among teachers.

THE position of the University of Birmingham was described by the Vice-Chancellor, Mr. Chamberlain, at the second annual Court of Governors held on January 8. On the occasion of the former annual meeting the fund raised for the purpose of the University amounted to 330,000*l.* ; it has now reached 420,000*l.* The Birmingham City Council has made a grant equal to a halfpenny in the pound on the borough rate, and this will provide about 5500*l.* per annum towards the ordinary maintenance of the University. The Staffordshire County Council has similarly identified itself with the aims of the University by making a grant of 500*l.* a year for five years in aid of the School of Mining and Metallurgy. It is hoped that the example

will be followed by the county councils of Worcestershire, Warwickshire and Shropshire, and that the annual contributions from all these sources will amount to at least 7000*l.* per annum. With the practical assurance of this income, a sum of 300,000*l.* is available for the new buildings of the University. It is estimated that the buildings contemplated cannot be erected and equipped for a less sum than a million sterling. Out of the ten departmental blocks of the University, three are to be commenced, in the first instance, to accommodate the schools of mining and metallurgy, and of civil, mechanical and electrical engineering. A University Hall will also be erected. While the University buildings are being erected, the Mason College must be extended in some way and its equipment increased, in order to accommodate the additional students who have entered since the University was founded. For this purpose 10,000*l.* will be required, and Mr. Chamberlain announced that 6000*l.* had already been subscribed.

SCIENTIFIC SERIALS.

Annals of Mathematics (July and October, 1901).—Concerning Du Bois Reymond's two relative integrability theorems. The two theorems considered by E. H. Moore are, (1) a continuous function of (properly) integrable functions is integrable ; (2) an integrable function of an integrable function is integrable. (1) was announced in 1880 and a proof published two years later (*Math. Ann.*, vols. xvi. and xx.). In connection with this proof (2) was announced. Dr. Moore in this note shows, by means of a simple example, that (2) is not true. Reference is made to a proof of (1) by Dini with an extension which is not applicable to the general case, but Dr. Moore extends Du Bois Reymond's general proof (1882).—P. Saurel, on a theorem of kinematics, gives an elementary demonstration of the well-known theorem that every displacement of a rigid body is equivalent to a rotation followed by a translation parallel to the axis of rotation.—The collineations of space which transform a non-degenerate quadric surface into itself, by Ruth G. Wood, discusses the ∞^6 collineations of space which transform the surface.—J. Westland contributes a note on multiply perfect numbers, with a view to determine all numbers of multiplicity 3 of the form $m = p_1 a_1 p_2 a_2 p_3$ where p_1, p_2, p_3 are three distinct primes and $p_1 < p_2 < p_3$.—The isoperimetrical problem on any surface, by J. K. Whittemore, gives a generalisation of the problem known to Pappus (see W. Thomson, " Popular Lectures and Addresses," vol. ii. p. 578). He solves Pappus's problem by the calculus of variations, and then solves, by an apparently novel method, the problem " Find a curve, $v = \phi(u)$, joining the two given points (u_0, v_0) and (u_1, v_1) having a given length L, and such that the area of the portion of the surface between the two curves, $v = f(u)$ and $v = \phi(u)$, shall be a maximum."—On a surface of the sixth order which is touched by the axes of all screws reciprocal to three given screws, by E. W. Hyde, has for its main object the determination and discussion of the envelope of a certain conicoid, which is touched by the axes of all screws of a certain system, so enabling one to grasp the nature of the system. The surface possesses other features of interest. The paper is illustrated with diagrams.—D. Sintsof, in a note sur l'évaluation d'une intégrale définie, discusses a previous note by M. Pell (evaluation of a definite integral, *Annals* (2), tome 1, No. 3).—The October number opens with a lengthy article (18 pp.) on the convergence of the continued fraction of Gauss and other continued fractions, by E. B. Van Vleck. Numerous references are given.—M. B. Porter supplies a short note on the differentiation of an infinite series term by term.—A note on geodesic circles, by J. K. Whittemore, discusses these circles in Bianchi's sense, viz. their definition is the locus of a point on a surface at a constant geodesic distance from a fixed point of the surface (" Vorlesungen über Differentialgeometrie," p. 160). Darboux (" Théorie Générale des Surfaces," vol. iii. p. 151) calls such a circle a curve of constant geodesic curvature. Mr. Whittemore gives three theorems—the first is, If, on a surface, there exists a family of concentric geodesic circles, such that the geodesic curvature of each curve of the family is constant, then the total curvature of the surface is constant along each curve of the family, and the surface is applicable to a surface of revolution, so that the geodesic circles fall on the circles of latitude of this surface.—Prof. Osgood gives a note on the functions defined by infinite series whose terms are analytic functions of a complex variable, with cor-

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 ·0000114 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. Stromeyer 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.

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 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 voltameter 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 œnanthylacetylene 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