

## NOTES.

AT the meeting of the London mathematical society held on April 26 the following papers were read: By E. B. ELLIOTT, "Perpetuants and contraperpetuants"; by A. C. DIXON, "A question in the theory of aggregates," and "The canonical forms of the ternary sextic and quaternary quartic;" by P. E. B. JOURDAIN, "On the question of the existence of transfinite numbers"; by G. H. HARDY, "Some theorems connected with Abel's theorem on the continuity of power series"; by A. R. RICHARDSON, "On a set of intervals about the rational numbers."

THE American philosophical society celebrated April 17-20 the two hundredth anniversary of the birth of its founder, Benjamin Franklin. Nearly one hundred and fifty learned societies and universities were represented at the celebration, Professor E. V. HUNTINGTON being the delegate of the AMERICAN MATHEMATICAL SOCIETY. Among the scientific papers which were presented, the following were of special interest to mathematicians: "The figure and stability of a liquid satellite," by G. H. DARWIN; "The present position of the problem concerning the first principles of scientific theory," by JOSIAH ROYCE; "Form analysis," by A. A. MICHELSON; "On positive and negative electrons," by H. A. LORENTZ.

THE next annual meeting of the Deutsche Mathematiker-Vereinigung will be held in affiliation with the seventy-eighth convention of the society of German naturalists and physicians at Stuttgart, September 16-22, under the presidency of Professor A. PRINGSHEIM, of Munich. While papers on other subjects are acceptable, principal emphasis will be put upon the theory of functions; various reports have been provided for, particularly of functions of several variables. Titles and abstracts of papers should be immediately sent to the secretary, Professor A. KRAZER, Karlsruhe in Baden, Westendstrasse 57.

THE sixth meeting of the Association of teachers of mathematics in the Middle States and Maryland was held at Columbia University on April 14. The New York section met at the same place on May 12. The Association will undertake the preparation of a bibliography of mathematical works useful to teachers. A similar undertaking was carried into effect some time ago by the Central Association. The Missouri Society of

teachers of mathematics, at a meeting held at Columbia, Mo., on May 5, decided to enlarge its scope to include the sciences. Mr. J. W. WITHERS was elected president for the coming year. Provision was made for representation in the organization of a national society and for cooperation with similar societies in the discussion of the teaching of elementary physics.

THE Colorado mathematical society was organized last November, Professor I. M. DeLong being the first president. Meetings are held at Denver at intervals of about six weeks.

THE publishing house of John Wiley and Sons, New York, announce the following mathematical books in press: "Introduction to infinitesimal analysis and functions of one real variable," by O. VEULEN and N. J. LENNES; "Textbook of mechanics," by L. A. MARTIN, volume one, Statics, volume two, Kinematics and kinetics; "Irrational numbers and their representation by sequences and series," by H. P. MANNING; "Mathematical monographs," edited by M. MERRIMAN and R. S. WOODWARD.

AMONG the books in press of the publishing house of B. G. Teubner in Leipzig, may be mentioned: *Encyclopädie der mathematischen Wissenschaften*, Band III, 1, *Prinzipien der Geometrie*, by F. ENRIQUES, *Die Begriffe Linie und Fläche*, by H. v. MANGOLDT, *Gegensatz von synthetischer und analytischer Geometrie in seiner historischen Entwicklung*, by G. FANO; III, 2, *Abzählende Methoden*, by H. G. ZEUTHEN, *Allgemeine theorie der höheren ebenen algebraischen Kurven*, by L. BARZOLARI; IV, 2, *Besondere Ausführungen über unstetige Bewegungen in Flüssigkeiten*, by G. ZEMPLÉN, *Hydraulik*, by PH. FORCHHEIMER, *Theorie der hydraulischen Motore und Pumpen*, by M. GRÜBLER, *Allgemeine Theorie der Elastizität*, by O. TEDONE, and five articles by joint authors for volume five, parts one and two. The first three volumes of tome one of the French edition are also in press.

THE Randolph Jones company of Chicago have prepared for sale a large number of Hanstein's model and goniostat for aid in the teaching of plane and solid geometry, perspective, shadow construction, etc.

AT the University of Berlin a prize of 1000 marks has been offered for the best doctor thesis in mathematics and physics submitted to the University in 1906.

THE philosophical faculty of the University of Halle announces the following prize problem :

It is known that the determination of surfaces having constant mean curvature depends upon the same differential equation as the determination of surfaces of constant negative curvature. A number of the latter surfaces are known, and also a number of solutions of the associated partial differential equation. The surfaces of constant mean curvature which belong to these solutions are to be investigated.

Competing manuscripts should be submitted to the Secretary of the University, under the usual conditions, before October 27, 1906. The prize of 150 Marks will be awarded January 27, 1907.

THE second section of the philosophical faculty of the University of Zürich announces the following prize problem :

The motion of a material point on the surface of a sphere is to be investigated by means of at least two of the more modern methods of astronomical mechanics and the results, both analytic and numerical, compared with those obtained by means of elliptic functions.

Competing memoirs should be sent to the Rector of the University under the usual conditions by December 31, 1906.

THE following advanced courses in mathematics are announced to be given at the summer session, July 5–August 16, of the respective universities :

COLUMBIA UNIVERSITY: By Professor JAMES MACLAY: Elliptic functions.—By Professor C. J. KEYSER; Modern analytical theories in geometry.—By Professor M. W. HASKELL: Integral calculus.—By Professor EDWARD KASNER: Differential calculus.

UNIVERSITY OF PENNSYLVANIA.—By Professor G. E. FISHER: Invariants and covariants.—By Professor J. I. SCHWATT: Definite integrals.—By Professor G. H. HALLETT: Theory of abstract groups.—By Dr. F. H. SAFFORD: Differential equations.

The following advanced courses in mathematics are announced for the academic year 1906–1907 :

COLUMBIA UNIVERSITY. — By Professor T. S. FISKE: Advanced calculus, introduction to the theory of functions of a

real variable, three hours; Functions defined by linear differential equations, three hours. — By Professor F. N. COLE: Introduction to the theory of functions, three hours; Theory of plane curves, three hours. — By Professor D. E. SMITH: History of mathematics, two hours. — By Professor JAMES MACLAY: Application of the calculus to the theory of surfaces, three hours; Elliptic functions, three hours. — By Professor C. J. KEYSER: Modern theories in geometry, three hours; Principles of mathematics, three hours. — By Professor H. B. MITCHELL: Elements of quaternions, two hours; Differential equations, two hours. — By Professor EDWARD KASNER: Partial differential equations, two hours. — By Dr. G. H. LING: Theory of numbers, three hours; Advanced theory of numbers, three hours. — By Professor M. I. PUPIN: Theory of the potential function, two hours; Partial differential equations of physics, two hours; Hydrokinetics, two hours; Special problems, two hours. — By Professor A. P. WILLS: Mechanics, two hours; Theory of elasticity, two hours; Electricity and magnetism, electromagnetic theory of light, two hours; Thermodynamics, two hours.

Special courses in mathematical physics, of about twelve lectures each, will be given by Professor J. LARMOR, of the University of Cambridge, and Professor O. LUMMER, of the University of Breslau. Dates of these lectures and further details will be announced later.

CORNELL UNIVERSITY. — By Professor L. A. WAIT: Advanced analytic geometry, three hours; Differential calculus, II, two hours. — By Professor G. W. JONES: Algebra and imaginaries, three hours. — By Professor J. MCMAHON: Mechanics and hydrodynamics, two hours; Fourier's series and spherical harmonics, three hours. — By Professor J. H. TANNER: Theory of equations, two hours. — By Professor J. I. HUTCHINSON: Projective geometry, three hours; Seminar in automorphic functions, two hours. — By Professor V. SNYDER: Algebraic plane curves, three hours; Definite integrals, two hours. — By Professor W. B. FITE: Theory of functions of a complex variable, three hours; Theory of groups, two hours (first half year); Theory of assemblages, two hours (second half year).

HARVARD UNIVERSITY. — By Professor W. E. BYERLY:

Dynamics of a rigid body, three hours. — By Professors W. E. BYERLY and B. O. PEIRCE: Trigonometric series, introduction to spherical harmonics, the potential function, three hours. — By Professor B. O. PEIRCE: Hydromechanics, two hours. — By Professor W. F. OSGOOD: Differential and integral calculus, second course, three hours; Infinite series and products, three hours, first half-year; Algebra, Galois's theory of equations, three hours, second half-year. — By Professor M. BÔCHER: Methods of interpolation and approximation, three hours, first half-year; Theory of numbers, three hours, second half-year; Linear differential equations of physics, three hours. — By Professor C. L. BOUTON: Differential equations, with an introduction to Lie's theory of continuous groups, three hours. — By Mr. J. K. WHITTEMORE: Theory of functions (introductory course), three hours; Introduction to the differential geometry of curves and surfaces, three hours, second half-year. — By Dr. J. L. COOLIDGE: Introduction to modern geometry and modern algebra, three hours; Line geometry, three hours. — By Professor E. V. HUNTINGTON: Short course on the fundamental concepts of mathematics. — Courses in reading and research are offered by Professor BYERLY, on Some famous problems in mechanics; by Professor OSGOOD, on Topics in the theory of functions; by Professor BÔCHER, on Fluctuating functions; by Professor BOUTON, on Topics in the theory of contact transformations; by Mr. WHITTEMORE, on Goursat's Cours d'analyse; by Dr. COOLIDGE, on Enriques's Projective geometry. — The mathematical conference will meet as usual.

UNIVERSITY OF BONN. — By Professor E. STUDY: Analytic geometry; II (projective geometry), three hours; Introduction to the theory of invariants, three hours; Seminar, two hours. — By Professor G. KOWALEWSKI: Introduction to the theory of numbers, two hours; Differential and integral calculus, four hours; Critical survey of new results in the theory of assemblages, one hour; Seminar, two hours. — By Professor F. LONDON: Descriptive geometry, four hours; Theory of elliptic functions, four hours; Seminar, two hours.

THE Special Board for Mathematics have issued a report with proposals which, if carried, will have the effect of altering the character of that time-honored institution, the mathematical tripos in Cambridge (England). At present the better stu-

dents take the examinations at the end of their third and fourth years, that for the latter consisting of advanced subjects only. It is proposed to divide the examinations into two parts, one of which would be taken by these men at the end of their first year: it would consist of elementary mathematics, including the calculus and the elements of dynamics, electricity and optics. The second part would be taken at the end of the third year: it is divided into two schedules. Schedule A consists of more advanced work in the same subjects and in addition, elementary theory of functions, differential equations, hydromechanics and astronomy; Schedule B contains the higher subjects. The men would therefore complete their course at the end of the third year instead of at the end of the fourth year; the additional time could be given to study without the compulsion of an examination. Students in physics and engineering would naturally take part I and schedule A of part II.

A feature of the proposals is to abolish the order of merit, arranging the names in three classes only, and attaching a special mark to the names of those who satisfy the examiners in schedule B and another special mark to those who deserve special credit in the subjects under this schedule.

Some quotations from the report may be of interest. The Board considers that under the old scheme "the ablest men . . . are encouraged to spend an excessive amount of time upon detailed work in the less advanced parts of mathematics." Again they spend "much time during the first three years of their course upon an excessive amount of polishing of their mathematical tools"; "leave themselves an insufficient amount of time for reaping the advantages of the skill they have acquired, by applying that skill to more advanced work." The educational side for others than professed mathematicians is also carefully considered.

At the technical school of Berlin, Dr. M. REISSNER has been appointed associate professor of mechanics and Dr. G. WALLENBERG has been appointed docent in pure mathematics.

Dr. C. v. WISSELINGH has been appointed professor of mathematics at the University of Groningen.

Professor J. A. GMEINER, of the German University at Prague, has been appointed professor of mathematics at the University of Innsbruck, as successor to the late Professor O. STOLZ.

PROFESSOR E. B. VAN VLECK, of Wesleyan University, has been appointed head professor of mathematics at the University of Wisconsin to succeed Professor C. A. VAN VELZER.

PROFESSOR J. A. MILLER, of the University of Indiana, has been appointed professor of mathematics and astronomy at Swarthmore College.

PROFESSOR G. A. MILLER, of Stanford University, has been appointed associate professor of mathematics at the University of Illinois.

PROFESSOR S. E. SLOCUM, of the University of Illinois, has been recalled to the University of Cincinnati, as professor of applied mathematics in the college of engineering.

PROFESSOR G. A. BLISS, of Princeton University, will become a member of the editorial board of the *Annals of Mathematics* with the beginning of the next volume in October, succeeding Professor H. S. WHITE, who retired last fall.

DR. C. N. HASKINS, of Cornell University, has been appointed assistant professor of mathematics at the University of Illinois.

AT the Massachusetts Institute of Technology the following changes are announced: Professor W. WELLS and Mr. W. S. MACDONALD have been granted leave of absence for next year; Professor F. S. WOODS has been promoted to a full professorship and Mr. N. R. GEORGE to an assistant professorship of mathematics.

PROFESSOR W. B. SMITH, of Tulane University, has been transferred from the chair of mathematics to a chair in philosophy.

DR. J. G. HARDY has been promoted to an associate professorship of mathematics at Williams College.

AT the University of Colorado Dr. SAUL EPSTEEN has been promoted to an assistant professorship of mathematics.

DR. C. E. COLPITTS, of Cornell University, has been appointed adjunct professor of mathematics at the Georgia School of Technology.

MR. L. P. SICELOF has been appointed tutor in mathematics at Columbia University.

PROFESSOR J. H. TANNER, of Cornell University, who has been absent on leave during the present academic year, will resume his work at the university in September.

MR. C. F. CRAIG has been appointed assistant in mathematics at Cornell University.

DR. O. E. GLENN has been appointed instructor in mathematics at the University of Pennsylvania.

RECENT catalogues of second-hand mathematical books : Theodor Ackermann, 10 Promenadenplatz, Munich, catalogue No. 550, 662 titles in mathematics and physics. Williams and Norgate, 14 Henrietta Street, Covent Garden, London, general science including journals, about 90 titles in mathematics. Mayer and Müller, Prinz Louis Ferdinandstrasse, 2, Berlin, N. W., catalogue No. 220, 142 pages on mathematics, physics, and astronomy ; W. Heffer and Sons, Cambridge, England, catalogue No. 16, 2722 titles on mathematics, physics, and astronomy ; Jacques Rosenthal, Karlstrasse, 10, Munich, catalogue No. 42, Bibliotheca Paedagogica, Part I, containing many early mathematical works. From May 21 to May 24, 1906, Southeby, Wilkinson and Hodge, of London, sold at auction the library of R. C. Fisher, Esq., which contained many Rara Mathematica, including the Treviso Arithmetic of 1478.