NOTES.

THE March number (series 2, volume 17, number 3) of the *Annals of Mathematics* contains the following papers: "An isomorphism between theta characteristics and the $(2p + 2)$-point," by A. B. COBLE; "On certain real solutions of Babbage's functional equation," by J. F. RITT; "Note on the preceding paper," by A. A. BENNETT; "An elementary exposition of the theory of the gamma function" (authorized translation from the Danish by T. H. GRONWALL), by J. L. W. V. JENSEN.

THE first four numbers of volume two of the *Proceedings of the National Academy of Sciences* contain: "Upper limit of the degree of transitivity of a substitution group," by G. A. MILLER; "An extension of Feuerbach's theorem," by FRANK MORLEY; "Deformations of transformations of Ribaucour," by L. P. EISENHART; "On the linear dependence of functions of several variables, and certain completely integrable systems of partial differential equations," by G. M. GREEN; "Point sets and allied Cremona groups (part II)," by A. B. COBLE; "On a theorem of Lucas," by M. B. PORTER; "Interpretation of the simplest integral invariant of projective geometry," by E. J. WILCZYNSKI.

UNIVERSITY OF CHICAGO.—The following courses are announced for the summer quarter, June 19–September 1: By Professor G. A. BLISS: Theory of functions of a real variable.—By Professor L. E. DICKSON: Substitution groups and algebraic equations, solution of numerical equations (first half); Determinants and symmetric functions (second half).—By Dr. C. R. DINES (of Dartmouth College): Differential equations.—By Professor W. D. MACMILLAN: Introduction to celestial mechanics.—By Professor E. H. MOORE: Integral equations in general analysis (first half); Limits (second half).—By Professor F. R. MOULTON: Theory of functions of infinitely many variables (second half); Series (second half).—By Professor A. RANUM (of Cornell University): Metric differential geometry.—By Professor H. E. SLAUGHT: Elliptic integrals.—By Professor J. W. A. YOUNG: Selected topics in mathematics.

THE following advanced mathematical courses are announced for the academic year 1916–1917:

UNIVERSITY OF CHICAGO.—By Professor G. A. BLISS: Theory of functions of a real variable (a); Calculus of variations (w); Functions of lines (s).—By Professor L. E. DICKSON: Theory of numbers (a); Algebraic numbers (w); Linear algebra (s); Theory of equations (w); Solid analytics (s).—By Professor K. LAVES: Analytic mechanics (a, w).—By Professor A. C. LUNN: Vector analysis (a); Applications to electromagnetics (w); Advanced calculus (a); Geometric introduction to the theory of the complex variable (w).—By Professor W. D. MACMILLAN: Introduction to celestial mechanics (w, s).—By Professor E. H. MOORE: Integral equations in general analysis (a, w, s); Seminar on the foundations of analysis (a, w).—By Professor F. R. MOULTON: Modern theories of analytic differential equations with applications to celestial mechanics and periodic orbits (a, w); Lunar theory (w); Application of the method of periodic orbits to the lunar theory (a).—By Professor H. E. SLAUGHT: Differential equations (a).—By Professor E. J. WILCZYNSKI: Projective geometry (a, w).—By Professor J. W. A. YOUNG: Limits and series (s).

COLUMBIA UNIVERSITY.—By Professor T. S. FISKE: Theory of functions, four hours.—By Professor M. W. HASKELL: Higher plane curves, three hours, first semester; Continuous groups, three hours, first semester.—By Professor F. N. COLE: Algebra, four hours.—By Professor JAMES MACLAY: Theory of numbers, three hours.—By Professor D. E. SMITH: History of mathematics, three hours; Seminar in the teaching of mathematics.—By Professor EDWARD KASNER: Contact transformations, two hours, second semester; Seminar in differential geometry.—By Professor W. B. FITE: Divergent series, three hours, second semester.—By Professor H. E. HAWKES: Differential geometry of curves, three hours, second semester.

JOHNS HOPKINS UNIVERSITY.—By Professor F. MORLEY: Higher geometry (first term), three hours; Theory of functions (second term), three hours.—By Professor A. B. COBLE: Finite groups, two hours; Probabilities (second term), two hours.—By Professor A. COHEN: Theory of numbers, two hours; Theory of functions, two hours.—By Dr. H. BATEMAN: Differential equations of physics, two hours.

UNIVERSITY OF ILLINOIS.—By Professor E. J. TOWNSEND: Functions of real variables, three hours; Differential equations, three hours.—By Professor G. A. MILLER: Elementary theory of groups, three hours; Theory of equations, three hours, first semester.—By Professor H. L. RIETZ: Actuarial theory, three hours.—By Professor J. B. SHAW: Vector methods, three hours.—By Professor C. H. SISAM: Invariants and higher plane curves, three hours; Solid analytic geometry, three hours, second semester.—By Professor A. EMCH: Automorphic functions, three hours.—By Professor R. D. CARMICHAEL: Theory of linear differential equations, three hours.—By Professor A. R. CRATHORNE: Projective geometry, three hours.—By Dr. E. B. LYTLE: History of mathematics, two hours, first semester.—By Dr. A. J. KEMPNER: Modern algebra, three hours.

DR. GEORGE SARTON, of Ghent, editor of *Isis*, has been appointed lecturer on the history of science at Harvard University. In the academic year 1916–1917 he will give two courses, one on "The origin and development of Greek science" and the other on the "Principles of mathematics historically considered." In the year 1917–1918 he will lecture on Hellenic science and on the principles of mechanics historically considered. He will also lecture on the history of science at the Lowell Institute in Boston.

THE Smith prizemen for the year 1916, announced by the University of Cambridge, are as follows: H. M. GARNER, of St. John's College, for his essay, "On orbital oscillation about the equatorial triangular configuration in the problem of three bodies"; G. P. THOMPSON, of Corpus Christi College, for his essay, "On aeroplane problems."

THE Rayleigh prize for 1916 has been awarded to W. M. SMART, of Trinity College, for his essay, "Libration on the Trojan planets."

PROFESSOR C. J. DE LA VALLÉE-POUSSIN, of the University of Louvain, has been elected to membership in the Paris academy of sciences.

PROFESSOR G. A. BLISS, of the University of Chicago, has been elected a member of the National academy of sciences.

PROFESSORS M. BÔCHER, of Harvard University, and F. R. MOULTON, of the University of Chicago, have been elected to membership in the American philosophical society. Professor J. D. v. d. WAALS, of Amsterdam, has been elected a foreign member of the society.

PROFESSOR C. J. KEYSER, of Columbia University, and Professor M. W. HASKELL, of the University of California, will exchange professorships during the first term of 1916–1917.

MR. R. W. DICKEY has been appointed associate professor of mathematics at Washington and Lee University.

DR. J. I. TRACY, of Yale University, has been promoted to an assistant professorship of mathematics.

DR. F. J. MCMACKIN, of Columbia University, has been appointed instructor in mathematics at Dartmouth College.

AT the University of Oklahoma Mr. C. T. LEVY, of the University of California, has been appointed instructor in mathematics. Mr. E. D. MEACHAM, instructor in mathematics, will spend a year's leave of absence in study at Harvard University.

PROFESSOR WEBSTER WELLS, for many years instructor and professor of mathematics in the Massachusetts Institute of Technology and author of several mathematical textbooks, died at Boston on May 23 at the age of sixty-five years. Professor Wells retired from active service in 1911. He was a member of the American Mathematical Society from 1891.

CATALOGUES of books:—Carnegie Institution of Washington, List of publications to March 1, 1916.—W. Heffer and Sons, Cambridge, England, catalogue 148, including selections from the library of the late E. J. Routh.