example, those arising in trigonometry, the principal relations between the elliptic integrals (Jacobian notation), and series for frequently occurring functions. In the last the author has been careful to state the limits within which the expansions are valid. At the end of the book are several numerical tables which include, beside the usual logarithmic and trigonometric ones, some four place tables of the elliptic integrals and of the gamma functions. In future editions a table of contents might be added.

ERNEST W. BROWN.

NOTES.

ATTENTION is called to the change-in the hours of meeting of the AMERICAN MATHEMATICAL SOCIETY. Hereafter the morning session will open at 11 o'clock and the afternoon session at 2 o'clock. The Council will meet at 10:15 a. m.

A NEW list of members of the Society will be issued in January. Forms for furnishing necessary information have been sent to each member, and a prompt response will be of great assistance to the Secretary.

A meeting of the National academy of sciences was held at Columbia University, November 14–16, pure and applied mathematics being represented by Professors Cleveland Abbe, C. S. Hastings, E. S. Holden, A. E. Michelson, Simon Newcomb, Mr. C. S. Peirce, and Professor R. S. Woodward. The following mathematical papers were presented at the meeting : Professor R. S. WOODWARD : "The statical properties of the atmosphere," "A direct proof of the effect on the eulerian cycle of an inequality in the equatorial moments of inertia of the earth ;" Mr. C. S. PEIRCE : "The definition of continuity," "Topical geometry in general," "The map-coloring problem."

THE preliminary programme for the November meeting of the London mathematical society announced the following mathematical papers: "Note on Clebsch's second method for the integration of a Pfaffian equation," by MR. J. BRILL; "On the forms of lines of force near a point of equilibrium" ; "The reduction of conics and quadrics to their principal axes by the Weierstrassian method of reducing quadratic forms;" and "On the reduction of a linear substitution to a canonical form, with applications to linear differ-

ential equations and quadratic forms, by Mr. T. J. I. BROMWICH ; "The abstract group isomorphic to the symmetric group of k letters," by DR. L. E. DICKSON ; "On Ampère's equation $Rr + 2Ss + Tt + U(rt-s^2) = V$," by PROFESSOR A. C. DIXON ; "Certain correspondences between spaces of n dimensions," by Professor E. O. LOVETT ; "The fundamental solutions of the indeterminate relation $\lambda x \gtreqless \mu y$," by MAJOR P. A. MACMAHON.

At the meeting of the Cambridge philosophical society held October 30th, 1899, a mathematical paper, "On semi-convergent series," was presented by MR. W. McF. ORR.

BEGINNING with the year 1900, the journal *Bibliotheca Mathematica*, devoted to the history of the mathematical sciences, founded in 1887 by G. ENESTRÖM, of the library of the University of Stockholm, will be published by B. G. Teubner, of Leipzig, under the editorial supervision of M. Eneström. In the future the form of the journal will be that of the *Mathematische Annalen*, and each volume will contain about five hundred and fifty pages. The editor solicits not only historical articles, but also all items of interest relative to current mathematical activity. Manuscripts may be written in German, French, English or Italian, and acceptable contributions will be accorded honoraria of twenty marks per sixteen printed pages, together with from ten to twenty reprints. The editor's address is Brahegatan 43, Stockholm.

THE publishing house of B. G. Teubner, Leipsic, announces that Vorlesungen über die Geschichte der Trigonometrie, by Dr. A. von BRAUNMÜHL ; and Vielecke und Vielflache, Theorie und Geschichte, by Dr. M. BRÜCKNER, are in preparation.

Messrs. Longmans, Green and Company, of New York, are issuing the fourth edition of BURNSIDE and PANTON's Theory of equations in two volumes ; the first volume is ready and contains all that is usually given in elementary works on the theory of equations, together with a short chapter on complex numbers ; the second volume is to include those subjects which are more appropriately included under the title of modern higher algebra.

Among the mathematical numbers of Harper's Scientific Memoirs, published by Messrs. Harper and Brothers, of New York, are The second law of thermodynamics, edited by Professor W. F. MAGIE ; The law of gravitation, by Pro-

fessor A. S. MACKENZIE; The wave-theory of light, by Professor HENRY CREW. The first of these is already in print.

PARIS FACULTY OF SCIENCES. The following mathematical courses are offered during the first semester of the current academic year, each course occupying two hours per week :—By Professor G. DARBOUX : Fundamental principles of infinitesimal geometry.—By Professor E. GOURSAT : Definite integrals and analytic functions.—By Professor P. APPELL : General laws of equilibrium and of motion.—By Professor H. POINCARÉ : The lunar theory.— By Professor V. J. BOUSSINESQ : Mechanical properties and motions of fluids.—By Professor G. KOENIGS : Kinematics of rigid or deformable bodies, applications to the study of machines.—Unassigned : Elements of analysis and mechanics.—By M. H. ANDOYER : General theory of planetary perturbations. Conferences will be conducted by Messrs. RAFFY, HADAMARD, PUISEUX, ANDOYER, and BLUTEL.

For the second semester the following courses are announced :—By Professor É. PICARD : Partial differential equations.—By Professor E. GOURSAT : Differential equations.—By Professor P. APPELL : General laws of motion of systems ; Analytic mechanics ; Hydrostatics and hydrodynamics.—By Professor BOUSSINESQ : Theory of waves. —By Professor KOENIGS : Theory of machines.—By M. RAFFY : Differential equations and their applications to mechanics and physics.

CAMBRIDGE UNIVERSITY. Dr. E. J. ROUTH and Mr. A. N. WHITEHEAD are moderators and Messrs. E. G. GALLOP and P. C. GAUL examiners for part I. of the mathematical tripos 1900 ; the examiners for part II. of the same year are Professor W. BURNSIDE and Messrs. H. F. BAKER, G. T. WALKER and H. M. MACDONALD. At St. John's College, Mr. W. A. HOUSTON, fifth wrangler 1896 and Smith's prizeman, 1898, has been elected to a fellowship in mathematics, and Mr. F. W. B. FRANKLAND, third wrangler in 1897, has received a similar appointment at Clare College.

A LEGACY left by one of its members, S. THOMASO VALLAURI, has enabled the Turin academy of sciences to establish a prize of thirty thousand lire to be conferred on the Italian or foreign scientist who shall have published during the interval between January 1, 1899, and December 31, 1902, the most remarkable and celebrated work on any of the

physical sciences, interpreting the phrase "physical sciences" in its largest sense. The prize will be awarded one year after the expiration of this interval. Neither resident nor non-resident national members of the Turin academy are eligible to the competition. No manuscripts will be received, nor will competing works be returned. The president of the academy is S. GIUSEPPE CARLE and S. A. NACGARI is secretary of the section of the physical sciences, mathematical and natural.

THE subject of Professor L. FUCHS's inaugural address as rector of the University of Berlin for the current year was "The reciprocal relations of pure science and technology."

LORD RAYLEIGH, professor of natural philosophy in the Royal Institution of Great Britain, received the Copley medal at the anniversary meeting of the London Royal Society this year for his investigations in mathematical and physical science.

MR. R. F. MUIRHEAD has been elected president of the Edinburgh mathematical society for the coming year.

DR. J. B. FAUGHT has been promoted from an instructorship to an assistant professorship at the University of Indiana.

DR. H. LIEBMANN has qualified as privat docent in mathematics at the University of Koenigsberg.

NEW PUBLICATIONS.

I. HIGHER MATHEMATICS.

ANDRÉEV (K. A.). Elementary course in analytic geometry. 2nd edition. (Russian.) Kharkov, 1896.   R. 3.20

BIANCHI (L.). Lezioni sulla teoria dei gruppi di sostituzioni e delle equazioni algebriche secondo Galois. *Pisa*, 1899. 8°. 283 pp.
                                                                    Fr. 10.00

——. Vorlesungen über Differentialgeometrie. Autorisierte deutsche Uebersetzung von G. Lukat. 3te (Schluss-) Lieferung. Leipzig, Teubner, 1898. 8vo. Pp. 1–16 and 529–659.   M. 4.00

BLUMENTHAL (O.). Ueber die Entwicklung einer willkürlichen Funktion nach den Nennern des Kettenbruches für $\int_{-\infty}^{*0} \frac{\phi(\xi)d\xi}{z-\xi}$. (Diss.) Göttingen, 1898. 8vo 57 pp.

BOBYNIN (V. V.). The section of mathematics, astronomy and physics at the first nine meetings of the Association of Russian naturalists