NOTES.

THE Christmas meeting of the Chicago Section of the AMERICAN MATHEMATICAL SOCIETY will be held at St. Louis, in conjunction with the meeting of Section A of the American association for the advancement of science, on Thursday and Friday, December 31 and January 1. Titles and abstracts of papers to be presented at this meeting should be in the hands of the Secretary of the Section, Professor Thomas F. Holgate, 617 Hamline Street, Evanston, Ill., not later than December 12.

THE closing (October) number of volume 4 of the *Transactions* of the AMERICAN MATHEMATICAL SOCIETY contains the following papers : "On the subgroups of order a power of p in the quaternary abelian group in the Galois field of order p^n," by L. E. DICKSON ; " On the order of linear homogeneous groups," by H. F. BLICHFELDT ; "Non-abelian groups in which every subgroup is abelian," by G. A. MILLER and H. C. MORENO ; "On nilpotent algebras," by J. B. SHAW ; " On solutions of differential equations which possess an oscillation theorem," by HELEN A. MERRILL ; "On the reducibility of linear groups," by L. E. DICKSON ; "Semireducible hyper-complex number systems," by S. EPSTEEN ; " A symbolic treatment of the theory of invariants of quadratic differential quantics of n variables," by H. MASCHKE ; "Congruences of curves," by L. P. EISENHART ; "Similar conics through three points," by T. J. I'A. BROMWICH.

THE opening (October) number of volume 5 of the *Annals of Mathematics* contains : "The mathematical theory of the top, I," by A. G. GREENHILL ; "On quadratic forms," by PAUL SAUREL ; " A generalized conception of area : applications to collineations in the plane," by E. B. WILSON ; " Lines of curvature on minimum developables," by F. S. WOODS.

THE Association of mathematical teachers in New England met on Saturday, November 14, at 11 o'clock at The Browne and Nichols School, 20 Garden Street, Cambridge, Mass. Mr. G. W. EVANS, of the English High School, Boston, read a paper on "Graphical representation in arithmetic and algebra," and Dr. E. V. HUNTINGTON, of Harvard University, gave a short account of Holzmüller's Stereometry.

THE first regular meeting of the Association of teachers of mathematics in the Middle States and Maryland will be held at Columbia University on Saturday, November 28, 1903. The following programme is announced : Address of welcome, by President BUTLER; "The laboratory method of teaching mathematics," by HARRY ENGLISH ; "The syllabus for geometry in the grades recently adopted for the New York schools," by I. N. FAILOR ; "Suggested topics for scientific investigation by this association," by ARTHUR SCHULTZE ; "The report of the committee of the AMERICAN MATHEMATICAL SOCIETY on college entrance requirements," by J. L. PATTERSON. An exhibition of models, apparatus, rare books, and autographs, of interest to teachers of mathematics, will also be held during the meeting.

THE international congress of arts and sciences, to be held in connection with the St. Louis Exposition, will extend through the week beginning September 19, 1904. Sectional meetings, either separately or in conjunction with other congresses or societies, will be continued in the following week, so far as may be found desirable. The administrative board has appointed Professor SIMON NEWCOMB president of the congress. The preliminary programme discloses an authoritative classification of the arts and sciences into seven divisions, twenty-six departments, and one hundred and thirty-one sections. Mathematics is grouped with philosophy as a normative science, and is divided into three sections : Algebra and analysis, Geometry, and Applied Mathematics. A large number of eminent scientists from abroad have been invited to participate in the congress. In each of the sections two addresses will be delivered, one on the relations to other sciences and one on the problems of to-day. An opening address will also be delivered by the president of the congress on its relations to scientific progress. The entire series of addresses, 322 in all, will be published by the exposition as a permanent memorial.

As the international congress of mathematicians at Heidelberg closes on August 13, it will be quite practicable for those desiring to do so to attend both meetings.

AN inquiry recently made in nine American universities as to the number of students taking certain advanced courses offered last year in the institutions considered, shows the following : Theory of functions of a complex variable, 67 ; Projective

geometry, 94; Theory of invariants, 26; Theory of groups, 45; Modern advanced theory of equations, 46; Theory of elliptic functions, 11. The numbers are suggestive of the growth of advanced courses in this country, although the statistics are unsatisfactory from the fact that certain other equally advanced courses are omitted, certain of those named are occasionally treated as elementary, and several institutions give the substance of these theories in other courses.

CAMBRIDGE UNIVERSITY. — Advanced mathematical courses for the current academic year are announced as follows :

Michaelmas term, 1903. — By Professor A. R. FORSYTH : Partial differential equations, three hours; Calculus of variations, two hours. — By Professor G. H. DARWIN : Theory of potential and attractions, three hours. — By Professor Sir R. S. BALL : Planetary theory, three hours. — By Professor J. LARMOR : Electrodynamics. — By Professor J. J. THOMSON : Properties of matter, two hours; Electricity and matter, two hours.— By Dr. E. W. HOBSON : Spherical and cylindrical harmonics, three hours. — By Mr. H. W. RICHMOND : Analytic geometry of curves, three hours. — By Dr. H. F. BAKER : Elementary theory of functions, three hours; Solid geometry, three hours. By Mr. H. M. MACDONALD : Waves (especially waves of light), three hours. — By Mr. G. B. MATHEWS : Theory of numbers, three hours. — By Mr. A. N. WHITEHEAD : Application of symbolic logic to Cantor's theory of aggregates, three hours. — By Mr. A. BERRY : Elliptic functions, Bessel functions and Fourier series, three hours. — By Mr. A. MONRO : Hydrodynamics and sound, three hours. — By Mr. E. T. WHITTAKER : The differential equations of applied mathematics, two hours.—By Mr. J. H. GRACE: Invariants and geometric applications, three hours.

Lent term, 1904. — By Professor A. R. FORSYTH : Partial differential equations (continued), three hours. — By Professor G. H. DARWIN : Figure of the earth and precession, three hours. — By Professor Sir R. S. BALL : Application of geometry to dynamics, three hours. — By Professor J. LARMOR : Electrodynamics with optical applications, three hours ; Elementary mathematical physics, three hours. — By Professor J. J. THOMSON : Electricity and magnetism, three hours ; Discharge of electricity through gases, two hours. — By Dr. E. W. HOBSON : Sound and vibrations, three hours.—By Mr. H. W. RICHMOND : Analytic geometry of three dimensions, projective

properties, three hours. — By Dr. H. F. BAKER: Theory of functions, three hours; Analysis. — By Mr. H. M. MAC-DONALD: Hydrodynamics. — By Mr. R. A. HERMAN: Hydromechanics, six hours (two courses). — By Mr. G. B. MATHEWS: Theory of numbers (continued), three hours. — By Mr. A. BERRY: Elliptic functions. — By Mr. G. T. BENNETT: Linear and quadratic complexes, three hours. — By Mr. E. T. WHITTAKER: General dynamics. — By Mr. J. H. GRACE: Invariants and geometric applications (continued), three hours.

Easter term, 1904. — By Professor J. LARMOR: The theory of gases and molecular statistics of energy, three hours. — By Professor J. J. THOMSON: Electricity and magnetism, three hours. — By Dr. H. F. BAKER: Theory of groups, three hours; Analysis (continued), three hours. — By Mr. W. L. MOLLISON: Theory of potential and electrostatics, three hours. — By Mr. A. N. WHITEHEAD: Non-euclidean geometry. — By Mr. E. T. WHITTAKER: The nebular hypothesis and related investigations, two hours.

Long vacation, 1904. — By Professor Sir R. S. BALL: Perturbation of cometary orbits, three hours. — By Mr. H. W. RICHMOND: Algebraic curves in connection with automorphic functions. — By Mr. W. M. COATES: Electricity and magnetism, three hours. — By Mr. J. G. LEATHEM: Physical optics, three hours.—By Mr. R. W. H. T. HUDSON: Kummer's quartic surface.

THE publication of an *Annuaire internationale des sociétés savantes*, edited by H. DELAUNY, is announced. The *Annuaire* notices over 5,000 learned societies.

THE second series of the Decennial Publications of the University of Chicago will include a volume, soon to appear, entitled Lectures on the Calculus of Variations, by OSKAR BOLZA. This is in substance a reproduction in considerably extended form of the lectures delivered by the author at the colloquium held in connection with the summer meeting of the AMERICAN MATHEMATICAL SOCIETY, at Ithaca, N. Y., in August, 1901.

Volume 8 of the first series of the Decennial Publications, which appeared last August, contained a paper, " On certain rigorous methods of treating problems in celestial mechanics," by F. R. MOULTON. Volume 9, devoted to mathematics, chem-

istry, physics, and geology, which also appeared in August, contains : "Concerning the geodesic curvature and the isoperimetric problem on a given surface" and "Proof of the sufficiency of Jacobi's condition of a permanent sign of the second variation in the so-called isoperimetric problems," by OSKAR BOLZA ; "Ternary orthogonal groups in a general field" and "The groups defined for a general field by the rotation group," by L. E. DICKSON ; "Invariants and covariants of quadratic differential quantics of n variables," by H. MASCHKE ; "The subgroups of the generalized finite modular group," by E. H. MOORE.

The articles which appeared in the first series are also issued separately as reprints, with heavy paper covers.

THE Prince Jablonowski society of Leipsic has awarded to Professor ERNST NEUMANN, of Breslau, its prize of 1,000 marks for an elaboration of Poincaré's memoir "On the method of Neumann and Dirichlet's problem," published in the *Acta Mathematica*, 1896.

The subjects proposed by the society for the years 1903 and 1904 have been noted in recent numbers of the BULLETIN.

THE Reale Accademia dei Lincei of Rome has elected Professor D. HILBERT, of Göttingen, to a foreign fellowship. The academy has deferred the award of the royal prize for mathematics for the current year.

DR. A. KORN has been promoted to a professorship of mathematics at the University of Munich. Dr. O. KRIGAR-MENZEL has been appointed to succeed the late Professor J. Weingarten in the Charlottenburg technical high school; O. SINTZOFF has been appointed to a professorship of mathematics in the University of Charkoff.

PROFESSOR W. WIRTINGER, of Innsbuck, has been called to the University of Vienna.

THE American academy of arts and sciences has elected, as foreign honorary members, Professors E. PICARD, of Paris, and J. LARMOR, of Cambridge.

PROFESSOR SIMON NEWCOMB has been made one of the vice-presidents of section A (mathematics and physics) of the British association for the advancement of science. The next meeting of the association will be held at Cambridge, beginning August 17, 1904.

THE college entrance examination board has appointed as examiners in mathematics for 1904, Professor F. N. COLE, Professor T. C. ESTY, and Dr. ARTHUR SCHULZE.

DR. H. E. HAWKES has been promoted to an assistant professorship of mathematics at Yale University.

MR. C. R. BURGER has been appointed assistant professor of mathematics at the Colorado School of Mines.

MR. A. C. MINEAR has been appointed professor of mathematics in the University of Southern California, to succeed Professor Paul Arnold.

THE following appointments have also been recently announced: Mr. C. GILMAN, as instructor in mathematics and surveying in Harvard University; Mr. F. C. EDMINSTER, as assistant in mathematics in Cornell University.

PROFESSOR J. F. DOWNEY, head of the department of mathematics in the University of Minnesota, has been appointed to the newly created office of dean of the faculty of science, literature and arts.

THE death is announced of Professor RUDOLF LIPSCHITZ, of the University of Bonn. Professor Lipschitz only recently celebrated the fiftieth anniversary of his doctorate.

THE following catalogues of second-hand mathematical works have recently been received: W. Heffer & Sons, 4, Petty Cury, Cambridge, England, 1485 numbers, including the library of the late Professor Stokes; Gustav Fock, 7 Schlossgasse, Leipzig, catalogue no. 230, 5419 numbers; A. Geering, Bäumleingasse 10, Basel, catalogue no. 292, 252 works on mathematics; W. Junk, 22 Rathenower Strasse, Berlin, catalogue no. 23, 40 pages.