

The treatment of multiple integrals though brief and incomplete is, on the whole, very good. We are glad to see several problems mentioned which are sometimes omitted in a course on this subject, such as the general problem of the calculus of variations. This Pascal calls, without sufficient reason we think, "Mayer's problem." The book closes with a discussion of the most famous problems of the calculus, *e. g.*, Newton's problem and the brachistochrone, with shorter notices of many others. The translator has added to the book some references to articles that have appeared since 1897, and indexes.

J. K. WHITEMORE.

HARVARD UNIVERSITY.

#### NOTES.

THE second number of the *Transactions* of the AMERICAN MATHEMATICAL SOCIETY, which has just appeared, consists of 162 pages and contains the following articles:—"On the metric geometry of the plane  $n$ -line," by F. MORLEY; "On relative motion," by ALEXANDER S. CHESIN; "Plane cubics and irrational covariant cubics," by HENRY S. WHITE; "A purely geometric representation of all points in the projective plane," by JULIAN LOWELL COOLIDGE; "The decomposition of the general collineation of space into three skew reflections," by EDWIN B. WILSON; "A new method of determining the differential parameters and invariants of quadratic differential quantities," by HEINRICH MASCHKE; "On the extension of Delaunay's method in the lunar theory to the general problem of planetary motion," by G. W. HILL; "On the types of linear partial differential equations of the second order in three independent variables which are unaltered by the transformations of a continuous group," by J. E. CAMPBELL.

THE INTERNATIONAL MATHEMATICAL CONGRESS AT PARIS: At the two general sessions of the congress, the following addresses will be delivered:—August 6th: "On the historiography of mathematics," by Professor M. CANTOR.—"Three Italian analysts, Betti, Brioschi, Casorati, and three ways of considering the questions of analysis; their influence," by Professor V. VOLTERRA.—August 11th: "A page from the life of Weierstrass," by Professor G. MIT-

TAG-LEFFLER.—“The rôle of intuition and logic in mathematics,” by Professor H. POINCARÉ.

The work of the congress will be carried on in six sections which will meet at least once daily. These sections are:—1° Arithmetic and algebra; 2° Analysis; 3° Geometry; 4° Mechanics, mathematical physics, and celestial mechanics; 5° Bibliography and history; 6° Teaching and methods. The members are requested to submit the subjects of their communications and the section to which they will be referred, before May 1st, to Professor H. Poincaré, president of the programme committee, rue des Grands-Augustins, Paris. The committee further requests that the time for the presentation of any communication be not allowed to exceed twenty minutes. Papers may be written and read in any of the four languages, German, English, French, and Italian.

THE final international conference on a catalogue of scientific literature has been postponed from Easter to June 12th. The conference takes place in London.

To the list of works on special branches of mathematics to be issued by B. G. Teubner, as announced in the April number of the BULLETIN, there should be added the following: W. F. OSGOOD, General theory of functions; W. WIRTINGER, Algebraic functions and their integrals, and Partial differential equations.

THE eighth edition of the logarithmic tables constructed by Professor GEORGE WILLIAM JONES, of Cornell University, has recently appeared bearing the imprint of Macmillan and Company, London, and G. W. Jones, Ithaca, N. Y., 1900.

CATALOGUES of new and second-hand mathematical works have recently been published by F. Muller and Company, Doelenstraat 10, Amsterdam, Holland, and B. Pellerano, Via Gennaro Serra 20, Naples, Italy.

H. WELTER, of Paris, has issued an elaborate catalogue of periodical publications, containing a number of broken and complete sets of the various mathematical journals of the world.

THE UNIVERSITY OF CHICAGO. The following advanced courses (four or five hours weekly) in pure mathematics have been announced for the summer quarter of 1900:—By Associate Professor H. MASCHKE: Elliptic functions; Modern analytic geometry; Advanced integral calculus, I.—

By Assistant Professor J. W. A. YOUNG: Theory of numbers; Pedagogy of mathematics (one-half course).—By Mr. J. A. SMITH: Theory of equations (first half of quarter, ten hours weekly.)

The mathematical club, with fortnightly meetings, is under the direction of the departmental faculties of mathematics and mathematical astronomy.

COLUMBIA UNIVERSITY. The following advanced courses are offered during the academic year 1900–1901 by the departments of mathematics and mechanics, each course extending throughout the year:—By Professor F. N. COLE: Riemann's theory of functions, including elliptic functions, three hours.—By Professor T. S. FISKE: Advanced calculus, three hours; Theory of abelian functions, three hours.—By Professor M. I. PUPIN: Electromagnetic theory of light, two hours; Spherical harmonics, two hours.—By Professor R. S. WOODWARD: Advanced analytical mechanics, two hours; Theory of the potential function, two hours.—By Mr. C. J. KEYSER: Modern theories of geometry, three hours.—By Dr. J. MACLAY: Analytical theory of curves of double curvature and curved surfaces, three hours.—By Mr. H. B. MITCHELL: Differential equations, three hours.—By Mr. J. C. PFISTER: Theoretical mechanics, two hours.

The mathematical colloquium is held fortnightly.

CORNELL UNIVERSITY. During the academic year 1900–1901, the following advanced courses will be offered by the department of mathematics, each course occupying either two or three hours a week, as indicated, and continuing through the year:—By Professor L. A. WAIT: Advanced analytic geometry, (a) plane, three hours, (b) solid, two hours; Advanced differential calculus, three hours.—By Professor J. McMAHON: Theoretical mechanics, two hours; quaternions, two hours; Potential and spherical harmonics, two hours; Mathematical theory of sound, two hours.—By Professor J. H. TANNER: Algebraic invariants, two hours. By Dr. D. A. MURRAY: Differential equations, three hours; Finite differences, two hours.—By Dr. J. I. HUTCHINSON: Advanced integral calculus, two hours; Calculus of variations, three hours.—By Dr. V. SNYDER: Projective geometry, three hours; Algebraic curves, two hours; General function theory, three hours; Theory of surfaces, two hours.—By Dr. G. A. MILLER: Theory of groups of a finite order, three hours; Theory of numbers, two hours.

The Oliver mathematical club will meet every other week.

HARVARD UNIVERSITY. During the year 1900–1901 Professor BÔCHER will be absent in Europe on leave. The following advanced courses in mathematics are offered :—By Professor J. M. PEIRCE : Tetrahedral coördinates, with applications to the study of points, lines, planes, and quadric surfaces ; Quaternions (second course) ; Quaternion imaginaries and other selected topics in quaternions ; † Linear associative algebra. †—By Professors BYERLY and B. O. PEIRCE : Trigonometric series, spherical harmonics, and potential function.—By Professor B. O. PEIRCE : Elasticity. †—By Professor OSGOOD : Infinite series and products ; † Galois's theory ; † either Calculus of variations, or Elliptic functions.—By Dr. BOUTON : Modern geometry ; Theory of functions (first course) ; Introduction to Lie's theory of groups.—By Mr. WHITTEMORE : Theory of equations and introduction to invariants ; † Calculus (second course) ; Differential geometry.—By Mr. COOLIDGE : Geometry of position.

These courses will each involve three lectures a week throughout the year, except those marked †, which involve about half this number of lectures. Professors ASAPH HALL and OSGOOD also offer courses in reading and research on Selected topics in celestial mechanics and Higher analysis, respectively.

During the summer semester, 1900, the several universities below offer the following mathematical courses :

UNIVERSITY OF INNSBRUCK. By Professor OTTO STOLZ : Differential and integral calculus, with exercises in seminar, four hours ; General arithmetic, second part, introduction to the theory of functions of complex variables, with exercises in seminar, three hours.—By Professor W. WIRTINGER : Analytical geometry of space (continued), three hours ; Theory of numbers (continued), two hours ; Seminar, two hours.

UNIVERSITY OF PRAGUE. By Professor G. PICK : Differential and integral calculus, three hours ; Elements of the calculus of variations, two hours ; Geometrical exercises, two hours.—By Professor F. LIPPICH : Theoretical mechanics, three hours ; Theory and applications of potential, two hours.

UNIVERSITY OF VIENNA. By Professor G. VON ESCHERICH : Elements of differential and integral calculus II, five hours ; Exercises on the preceding course, two hours ; Seminar, two hours ; Proseminar, one hour.—By Professor L. GEGEN-

BAUER : Algebra (continued), four hours ; Elements of the theory of invariants, one hour ; Mathematical statistics, three hours ; Proseminar, one hour ; Seminar, two hours. —By Professor F. MERTENS : The laws of reciprocity (continuation), five hours ; Theory of probabilities, three hours ; Seminar, two hours ; Proseminar, one hour. —By Professor G. KOHN : Analytical geometry of space, four hours ; Exercises on the preceding, one hour. —By Dr. V. SERSAWY : The mathematics of insurance, I, three hours, II, four hours. —By Dr. A. TAUBER : Elements of perspective, two hours ; Insurance mathematics (continued), four hours ; Exercises on the latter course, two hours. —By Dr. K. ZINDLER : Kinematics, two hours. —By Dr. E. BLASCHKE : Introduction to mathematical statistics, II, three hours. —By Dr. K. ZSIGMONDY : The transcendentality of the numbers  $e$  and  $\pi$ , one hour. —By Dr. R. D. v. STERNECK : Elementary theory of numbers, two hours.

THE following subject has been announced by the Madrid academy of sciences for its mathematical prize for the year 1901 : “Didactic exposition of the modern theories of non-euclidean geometry, or a detailed analysis of the principal works upon this branch of science from the time of Gauss to the present.” Competing memoirs should be written in Spanish or Latin and will be received by the secretary of the academy before December 31st, 1901. The first prize consists of fifteen hundred pesetas and a gold medal.

AMONG the corresponding members elected by the Berlin academy of sciences at its recent celebration commemorating the two hundredth anniversary of its foundation are the mathematicians Professor P. GORDAN, of Erlangen, Professor F. MERTENS, of Vienna, and Professor F. SCHOTTKY, of Marburg.

PROFESSOR P. DRUDE, of Leipsic, has become professor of mathematical physics at the University of Giessen.

It is reported that Professor L. BOLZMANN, of the University of Vienna, has received a call to the University of Leipzig and is considering it favorably.

DR. J. HORN, formerly docent at the Polytechnic Institute at Charlottenburg, has been called to the School of Mines at Clausthal as professor of mathematics.

DR. L. E. DICKSON has resigned an associate professorship in mathematics at the University of Texas to become assistant professor at the University of Chicago. DR. H.

E. SLAUGHT has been promoted to an assistant professorship of collegiate mathematics in the latter university.

UNDER the recent readjustment of its relation to Columbia University, Barnard College is hereafter to have a distinct department of undergraduate mathematics. Professor F. N. COLE has been made head of this department, retaining however his position in the university graduate school of pure science. Dr. EDWARD KASNER (Ph.D., Columbia) has been appointed tutor, and Miss GRACE ANDREWS (M.A., Columbia) assistant in the department at Barnard.

DR. J. B. CHITTENDEN, tutor in mathematics at Columbia University, has been appointed professor of mathematics in the Brooklyn Polytechnic Institute, Brooklyn, N. Y. Mr. H. B. MITCHELL, assistant in mathematics at Columbia, has been promoted to a tutorship.

MR. A. D. FOX has been made professor of mathematics at Whitman College, Walla Walla, Wash.

MR. E. A. PATTINGILL, recently a graduate student at Cornell University, has been appointed instructor in mathematics in the Iowa State Agricultural College.

THE death is announced of Professor B. CHRISTOFFEL, professor of mathematics at the University of Strassburg, aged seventy years; Professor Christoffel had offered no lectures since 1894 on account of ill health.

THE death is also announced of Professor WILLIAM M. THRASHER, for many years professor of mathematics at Butler University, Irvington, Ind.

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## NEW PUBLICATIONS.

### I. HIGHER MATHEMATICS.

BENNER (H.). Bestimmung der Coefficienten, welche bei der Berechnung der Integrale  $\int \frac{x^n dx}{\sqrt{1+ax+bx^2}}$  und  $\int \frac{x^n dx}{\sqrt{1+ax+bx^2+cx^3}}$  auftreten. (Diss., Erlangen, 1897.) Boston, Ginn, 1899. 8vo. 10 + 59 pp.

BIBLIOTHECA MATHEMATICA. Zeitschrift für Geschichte der mathematischen Wissenschaften, herausgegeben von G. Eneström. 3te [erweiterte] Folge. Vol. I: 1900. Leipzig, Teubner, 1900. Per annum M. 20.00