

educational value provided the pupil has not become so saturated with intuitional ideas derived from the first part that he cannot rid himself of them. It seems to me that in the hands of a skillful teacher the book would prove of value, although the only test is that of actual use. A school text in geometry which succeeds in making a direct and natural transition from the traditional programme to such books as von Staudt's and as Enriques's will be a welcome addition to our mathematical literature.

VIRGIL SNYDER.

Zwölf Vorlesungen über die Natur des Lichtes. Von J. CLASSEN. Leipzig, G. J. Göschen, 1905. x + 249 pp.

The author has already published through Göschen in the Sammlung Schubert three volumes on electricity, magnetism, and light which appeal to a technical public of mathematicians and physicists. The present volume, which is not in the Sammlung Schubert, is of a wholly different character. It is the reprint of a series of lectures given before a lay public and consequently freed of all technicalities whether mathematical or physical. The aim of the book is to set forth and discuss those simple experiments which begin with showing the rectilinear propagation of light and advance systematically and logically to the end of demonstrating the electromagnetic nature of light. A large range of phenomena is treated, including even the latest researches, such as those of Rubens, which put the electromagnetic theory upon a seemingly sure footing. A mathematical treatment of the subject built up in the same straightforward and logical manner would be highly useful, and better worth our attention here.

E. B. WILSON.

NOTES.

THE ninth regular meeting of the San Francisco Section of the AMERICAN MATHEMATICAL SOCIETY will be held at Stanford University on Saturday, February 24. Abstracts of papers intended for presentation should be in the hands of the Secretary of the Section, Professor G. A. Miller, Stanford University, as early as February 10.

AT the recent meeting of the Chicago Section, Professor T. F. HOLGATE, who has served as Secretary since the organization of the Section in 1897, withdrew from that office, which was thereupon filled by the election of Professor H. E. SLAUGHT. The next meeting of the Section falls on Saturday, April 14.

THE opening (January) number of volume 7 of the *Transactions of the American Mathematical Society* contains the following papers: "On the relation between the three parameter groups of a cubic space curve and a quadric surface," by A. B. COBLE; "On certain hyperabelian functions which are expressible by theta series," by J. I. HUTCHINSON; "On the form of a plane quintic curve with five cusps," by P. FIELD; "The symbolic treatment of differential geometry," by A. W. SMITH; "Groups whose orders are powers of a prime," by W. B. FITE; "Differential parameters of the first order," by H. MASCHKE; "The Kronecker-Gaussian curvature of hyperspace," by H. MASCHKE; "Groups containing only three operators which are squares," by G. A. MILLER; "Theorems converse to Riemann's on differential equations," by D. R. CURTISS; "General mean value and remainder theorems," by G. D. BIRKHOFF; "Determination of the abstract groups of order p^2qr ; p, q, r being distinct primes," by O. E. GLENN; "Note on the differential invariants of a surface and of space," by C. N. HASKINS; "On improper multiple integrals," by JAMES PIERPONT.

THE opening (January) number of volume 28 of the *American Journal of Mathematics* contains: "On the quaternary linear homogeneous groups modulo p of order a multiple of p ," by L. E. DICKSON; "On the integration of a system of differential equations in kinematics," by J. EIESLAND; "On the determination of the properties of the nodal curve of a unicursal ruled surface," by C. H. SISAM; "Certain surfaces with plane or spherical lines of curvature," by L. P. EISENHART; "The motion of a solid in an infinite liquid," by A. G. GRANVILLE.

THE January number (volume 7, number 2) of the *Annals of Mathematics* contains: "The harmonic analysis of the semi-circle and of the ellipse," by A. E. KENNELLY; "Note on the possible number of operators of order 2 in a group of order 2^m ," by G. A. MILLER; "A geometrical problem connected with the continuation of a power series," by H. MASCHKE; "On

the determination of a catenary with given directrix and passing through two given points," by H. F. MACNEISH; "Concerning the discontinuous solution in the problem of the minimum surface of revolution," by H. F. MACNEISH; "Introduction to the theory of Fourier's series" (to be continued), by M. BÔCHER.

AT the meeting of the London mathematical society held on December 14 the following papers were read: "On well-ordered aggregates," by Professor C. A. DIXON; "Tables of coefficients for Lagrange's interpolation formula," by Col. R. L. HIPPISEY; "On the representation of certain asymptotic series as convergent continued fractions," by Professor L. J. ROGERS; "On a new cubic connected with the triangle," by Mr. H. L. TRACHTENBURG; "Some difficulties in the theory of transfinite numbers and order types," by Hon. B. A. W. RUSSELL; "The imaginary in geometry," by Mr. J. L. S. HATTON.

THE third annual meeting of the association of Ohio teachers of mathematics and science was held at the Ohio State University, Columbus, December 28, 1905. Two sessions were held in each section. The following papers in mathematics were read: "Do the mathematical courses in literary colleges properly fit for the mathematics of engineering?" by C. HORNUNG; "Recent contributions marking a real advance in the theory of mathematics teaching," by Miss A. H. PALMIÉ; "Sir Isaac Newton, an estimate," by C. L. ARNOLD; "A contribution from non-euclidean geometry to school spherics," by G. B. HALSTED; "Symbolism in mathematics," by Miss H. E. GLAZIER; "The character of mathematics teaching in the high school," by W. T. HEILMAN; "The influence of college entrance certificates on the teaching of mathematics in the high schools," by H. E. GILES; "Report of committee on syllabus," by G. B. HALSTED. The officers for the present year are: president, W. H. WILSON; vice-president, J. O. WILLIAMS; secretary, T. E. MCKINNEY.

AT the last meeting of the central association of science and mathematics teachers, the following officers were elected: president, O. W. CALDWELL; secretary, C. M. TURTON; treasurer, C. W. D. PARSONS. The officers of the mathematics section are: chairman, J. V. COLLINS; vice-chairman, H. E. SLAUGHT; secretary, Miss MABEL SYKES.

THE mathematical section of the California teachers association held two meetings at Berkeley on December 26 and 28. The following papers were read: "How to cultivate the power to think mathematically," by I. STRINGHAM; "Vital questions for teachers of secondary mathematics," by J. B. CLARKE. During the business meeting the section adopted *School Science and Mathematics* as its official journal, and re-elected the following officers: president, G. A. MILLER; vice president, W. H. BAKER; secretary, J. F. SMITH.

AT the meeting of the mathematics section of the Indiana state teachers association held at Indianapolis December 27, a committee of five with Professor D. A. ROTHROCK, of Indiana University, as chairman was appointed to perfect a plan of organization of the mathematics teachers of the state into an Indiana association of mathematics teachers. The proposed association will meet for organization at Indianapolis, March 30.

THE *Annals of Mathematics*, in pursuance of the policy announced in 1899, when the responsibility for the journal was assumed by Harvard University, has published a considerable number of articles whose purpose is not so much to present new results as to render more accessible, or put in better form, some important portion of mathematical theory. It may not be generally known that reprints of most of these expository articles can be obtained from the Publication Office of Harvard University, 2 University Hall, Cambridge, Mass., at prices ranging from thirty-five to seventy-five cents. The list of titles is as follows:

Galois's theory of algebraic equations. By JAMES PIERPONT. 67 pages.

The theory of linear dependence. By MAXIME BÔCHER. 16 pages.

Sufficient conditions in the calculus of variations. By W. F. OSGOOD. 25 pages.

Space of constant curvature. By F. S. WOODS. 42 pages.

The integral as the limit of a sum, and a theorem of Duhamel's. By W. F. OSGOOD. 18 pages.

The continuum as a type of order: an exposition of the modern theory. With an appendix on the transfinite numbers. By E. V. HUNTINGTON. 63 pages.

Introduction to the theory of Fourier's series. By MAXIME BÔCHER. (In press.)

The following pamphlets are also on sale at the same place :
Regular points of linear differential equations of the second order. By MAXIME BÔCHER. 23 pages.

Introduction to infinite series. By W. F. OSGOOD. 71 pages.

THE following books are announced by the firm of B. G. Teubner, Leipzig, to be in press, and will probably appear in a few weeks : *Encyklopädie der mathematischen Wissenschaften*, II, 1 ; III, 1, 2 ; IV, 2 ; V, 1 ; VI, 1, 2 ; *Encyclopédie des sciences mathématiques*, tome I, volumes 1, 2, 3, 4 ; H. POINCARÉ, *Der Wert der Wissenschaft*, translated by E. WEBER ; Serret-Harnack, *Lehrbuch der Differential- und Integralrechnung*, in 3 Bänden, dritte Auflage, by G. SCHEFFERS. The German translation of Enriques's *Questioni riguardanti la geometria elementare*, by H. FLEISCHER, will be enlarged to two volumes, of which the second, *Die geometrischen Aufgaben*, is in the press. The first volume is promised for next fall.

AT the annual public meeting of the Paris academy of sciences, held on December 18, 1905, the following prizes were awarded for mathematical memoirs : the Francoeur prize (fr. 1000) to H. STOUFF ; the Poncelet prize (fr. 2000) to N. LALLEMAND ; two Petit d'Ormay prizes (each fr. 10000), one to É. BOREL, the other to M. COSSANTIN. The subjects for which these prizes were offered were announced in the *BULLETIN*, volume 11, page 327.

UNIVERSITY OF PARIS. (The following courses are given during the present semester.)—By Professor G. DARBOUX : General principles of differential geometry, curvilinear coördinates and quadratic differential forms, two hours.—By Professor E. GOURSAT : Elements of the theory of analytic functions, two hours.—By Professor P. PAINLEVÉ : General laws of motion and of equilibrium, two hours.—By Professor P. APPELL : Elements of mathematics preparatory to mechanics and physics, two hours.—By Professor L. RAFFY : Geometric applications of analysis, two hours.—By Professor H. POINCARÉ : Planetary perturbations and development of the perturbation function, two hours.—By Professor J. BOUSSINESQ : Mechanical properties of fluids, two hours.—By Professor E. BOREL : Selected chapters in the theory of integral

functions, one hour.—By Professor G. KOENIGS: General kinematics, two hours.—By Dr. P. PUISEUX: Stars and eclipses, one hour. Mathematical conferences will be held by Professors Goursat, Hadamard, Raffy, Drs. Blutel and Servant.

OXFORD UNIVERSITY (*Hilary term*).—By Professor W. ESSEN: Comparison of analytic and synthetic methods in the geometry of conics, two hours; Synthetic geometry of cubics, one hour.—By Professor E. B. ELLIOTT: Elements of elliptic functions, two hours; Theory of numbers, II, one hour.—By Professor H. H. TURNER: Elementary mathematical astronomy, two hours.—By Professor A. E. H. LOVE: Theory of potential, two hours; Elements of the calculus, two hours.—By Mr. J. W. RUSSELL: Algebra of quantics, two hours.—By Mr. P. J. KIRKBY: Higher algebra, one hour.—By Mr. A. L. DIXON: Calculus of finite differences, one hour.—By Mr. J. E. CAMPBELL: Differential geometry, two hours.—By Mr. C. H. SAMPSON: Solid geometry, II, two hours.—By Mr. A. L. PEDDER: Trigonometry, one hour.—By Mr. C. LEUDESORF: Geometry, two hours.—By Mr. A. E. JOLLIFFE: Analytic geometry, II, two hours.—By Mr. R. F. MCNEILE: Integral calculus, two hours.

UNIVERSITY OF INNSBRUCK. (The following courses are announced for the summer semester, 1906.)—By Professor K. ZINDLER: Analytic geometry of two and three dimensions, II, four hours; Selected chapters of line geometry, three hours.—By Professor J. MENDER: Descriptive geometry with exercises, II, four hours. The successor of the late Professor O. Stolz has not yet been appointed.

DR. H. HAHN, of the technical school at Vienna, has charge of the courses which were announced for the late Professor Otto Stolz for the present semester at the University of Innsbruck.

DR. F. COHN has been promoted to an associate professorship of mathematics and astronomy at the University of Königsberg.

DR. H. VON KOCH, of the University of Stockholm, has been appointed professor of pure mathematics at the technical school of Stockholm.

PROFESSOR R. MÜLLER, of the technical school of Berlin, has been granted a leave of absence for the present academic year.

DR. G. FABER has been appointed docent in mathematics at the technical school at Karlsruhe.

DR. E. STÜBLER has been appointed docent in mathematics at the technical school of Berlin.

PROFESSOR A. PRINGSHEIM, of the University of Munich, and Professor R. FRICKE, of the technical school at Brunswick, have been elected corresponding members of the Göttingen academy of sciences.

PROFESSOR K. BOEHM, of the University of Heidelberg, and Professor J. HURWITZ, of the technical school at Zürich, have been granted leave of absence for the present semester on account of ill health.

PROFESSOR G. BAUER, of the University of Munich, celebrated his eighty-fifth birthday November 18.

MR. RICHARD MORRIS, instructor in mathematics at Rutgers College, has been promoted to an associate professorship of graphics and applied mathematics.

PROFESSOR C. J. JOLY, of the University of Dublin, and royal astronomer of Ireland, died in December, 1905, at the age of 42 years.

NEW PUBLICATIONS.

I. HIGHER MATHEMATICS

- ACHSEL (R.). Ueber den Zahlbegriff bei Leibniz. Wilmersdorf, 1905. 4to. 20 pp. M. 1.50
- ARNDT (K.). Grundbegriffe der höheren Mathematik für Chemiker. Berlin, Mayer, 1905. 8vo. 60 pp. M. 1.50
- BORTOLOTTI (E.). Lezioni sul calcolo degli infinitesimi date nella R. Università di Modena. Modena, 1905. 8vo. 7 + 61 pp. L. 3.00
- ERTELT (G.). Synthetische Beweise einiger Sätze aus der Theorie der Flächen zweiten Grades. (Progr.) Bielitz, 1905. 8vo. 21 pp.