limits set by the title, the book closing with a discussion of the elementary properties of quadrics, such as tangent planes, diameters, rectilinear generators, etc. The collection of exercises is large, and figures and type are clear and attractive.

PERCEY F. SMITH.

SHEFFIELD SCIENTIFIC SCHOOL,
        December, 1902.

NOTES.

THE opening (January) number of volume 4 of the *Transactions* of the AMERICAN MATHEMATICAL SOCIETY contains the following papers : " Orthocentric properties of the plane n-line," by FRANK MORLEY ; " Definitions of a field by independent postulates," by L. E. DICKSON ; " Definitions of a linear associative algebra by independent postulates," by L. E. DICKSON ; " Two definitions of a commutative group by sets of independent postulates," by E. V. HUNTINGTON ; " Definitions of a field (Körper) by sets of independent postulates," by E. V. HUNTINGTON ; " On the invariants of differential forms of degree higher than two," by C. N. HASKINS ; Ueber die Reducibilität der Gruppen linearer homogener Substitutionen," by ALFRED LOEWY ; " The quartic curve as related to conics," by A. B. COBLE ; " The cogredient and digredient theories of multiple binary forms," by EDWARD KASNER ; " On the envelopes of the axes of a system of conics passing through three points," by R. E. ALLARDICE ; " A Jordan curve of positive area," by W. F. OSGOOD.

THE January number (volume 25, number 1) of the *American Journal of Mathematics* contains : " The parametric representation of the tetrahedroid surface," by D. N. LEHMER ; " On ternary monomial substitution groups of finite order with determinant ± 1," by E. B. SKINNER ; " On forms of unicursal sextic scrolls," and " On forms of sextic scrolls of genus one," by VIRGIL SNYDER ; " Note on symmetric functions," by E. D. ROE, Jr.

THE number contains a portrait of Professor L. CREMONA.

THE lectures delivered by Professor OSKAR BOLZA before the colloquium of the AMERICAN MATHEMATICAL SOCIETY at Ithaca, N. Y., in August, 1901, will be published early in the

spring as one of the supplementary volumes of the Decennial publications of the University of Chicago, under the title : "Lectures on the calculus of variations."

THE committee on definitions of college entrance requirements in mathematics, appointed by the AMERICAN MATHEMATICAL SOCIETY at the summer meeting held at Evanston, September, 1902, presented to the Council, on December 29, a tentative report, in the form of a memorandum. In this memorandum are defined the requirements in algebra, plane geometry, solid geometry, higher algebra, and plane trigonometry. Algebra covers the elementary subject through the progressions, with the note that a college finding it impracticable to meet this normal requirement is advised to demand algebra through quadratics, and that a college preferring to hold two examinations is advised to make the division immediately before quadratic equations. Plane geometry is defined as including the usual theorems and constructions of good standard text-books, the solution of original exercises, applications to problems of mensuration of lines and of plane figures, and to loci problems. Solid geometry is similarly defined. Higher algebra is taken to cover permutations and combinations, applications of the principle of mathematical induction, theory and use of logarithms (not involving infinite series), determinants, elements of the theory of equations (with graphic methods), Horner's method, elements of the theory of complex numbers (with graphic representation, limited to sums and differences). Plane trigonometry is defined to include the six functions as ratios ; the proofs of principal formulas, in particular the sine, cosine and tangent of $A \pm B$ and of $2A$, and the product expressions for the sum or the difference of two sines or of two cosines ; the properties of logarithms and the use of tables ; the solution of triangles, with applications.

THE first winter meeting of the American association for the advancement of science was held at Washington, D. C., during convocation week, December 29, 1902, to January 3, 1903. Among the officers elected for the present year are : President of the Association, CARROLL D. WRIGHT ; Vice-President of Section A, A. H. TITTMANN ; Secretary of Section A, L. G. WELD. The next meeting of the Association will be held at St. Louis in convocation week, 1903–1904.

AT the meeting of the London mathematical society held on December 11, 1902, the following papers were read: By Professor L. E. DICKSON: (1) "The abstract group simply isomorphic with the group of linear fractional transformations in a Galois field;" (2) "Generational relations of an abstract simple group of order 4080;" by Dr. H. F. BAKER: (1) "On the calculation of the finite equations of a continuous group," (2) "On the integration of linear differential equations," (3) "On some cases of matrices with linear invariant factors;" by Professor M. J. M. HILL: "The continuation of the power series for arcsin x;" by Mr. E. T. WHITTAKER: "The functions associated with the parabolic cylinder in harmonic analysis;" by Mr. H. M. MACDONALD: "Some applications of Fourier's theorem;" by Rev. F. H. JACKSON: "Series connected with the enumeration of partitions;" by Mr. W. H. YOUNG: "Sets of intervals, part ii: overlapping intervals;" By Mr. G. H. HARDY: "On the expression of the double zeta and gamma functions in terms of elliptic functions;" by Mr. J. H. GRACE: "Perpetuants (second paper)."

OXFORD UNIVERSITY.—The following courses in mathematics are announced for Hilary term, 1903: By Professor W. ESSON: 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.—By Professor A. E. H. LOVE: Attractions and electrostatics, two hours; Theory of potential, one hour.—By Mr. A. L. DIXON: Calculus of finite differences, one hour.—By Mr. J. E. CAMPBELL: Algebra of quantics, one hour.—By Mr. P. J. KIRKBY: Higher plane curves, two hours. —By Mr. C. H. SAMPSON: Solid geometry (continued), two hours.—By Mr. C. E. HASELFOOT: Theory of equations, one hour.—By Mr. J. W. RUSSELL: Pure geometry, two hours. —By Mr. C. LEUDESDORF: Geometry (maxima and minima, inversion, etc.), two hours.

AT the annual public meeting of the Paris academy of sciences, held on December 22, 1902, the following mathematical prizes were awarded: Grand prize, 3,000 francs, ERNEST VESSIOT; very honorable mention, JEAN LE ROUX; Bordin prize, 3,000 francs, not awarded; very honorable mention, W. DE TANNENBERG; Francœur prize, 1,000 francs, ÉMILE LEMOINE; Poncelet prize, 2,000 francs, MAURICE D'OCAGNE;

Extraordinary prize of 6,000 francs, divided between M. ROMA-ZOTTI and M. DRIENCOURT.

THE International congress of historical sciences, which was projected to be held at Rome in April, 1902, but was afterward postponed, will meet in that city on April 2–9, 1903. Eight sections have been arranged, of which the last is devoted to the history of mathematical, physical, natural and medical sciences. The invitations to participate in section VIII are issued by a committee of which Professor Gino Loria of Genoa is the representative of the interests of pure mathematics. Information concerning the congress may be obtained by addressing the Segretariato generale del congresso internazionale di scienze storiche, Collegio Romano, via del Collegio Romano, 26, Rome.

THE press of Girardi and Audebert, of Dole, France, has recently issued a circular of information, in English, for the benefit of American and other foreign students who contemplate attending the French universities. The circular covers particularly the questions of matriculation and degrees, but it also gives valuable information concerning the various university centers. The Report, just issued, of the U. S. Commissioner of Education, 1901, volume 1, page 1113, gives similar information.

THE first annual *Sitzungsbericht* of the Berlin mathematical society, has been reprinted from the *Archiv der Mathematik und Physik*, and published separately. Presumably it is intended to issue these proceedings annually in this form.

THE following academic appointments and promotions have recently been announced : DR. ALBERT BENTELI has been appointed professor of geometry in the University of Bern. Dr. A. SUCHARDA has been made professor of mathematics in the Bohemian Technical high school at Brünn. Dr. V. VARICAK has been made professor of mathematics in the University of Agram. M. GUITTON, of the lycée at Caen, has been appointed to a lectureship in mathematics in the faculty of sciences in that city ; M. ZORETTI to an instructorship in mathematics in the Ecole normale supérieure, Paris.

AMONG recently elected foreign members of the Royal Society are Dr. G. W. HILL and Professor GASTON DARBOUX. The Society has awarded its medal to Professor HORACE LAMB for his investigations in mathematical physics.

PROFESSOR LUIGI CREMONA, of Rome, has been elected a foreign member of the American academy of arts and sciences, of Boston.

PROFESSOR C. SEGRE, of Turin, has been elected an honorary fellow of the Cambridge philosophical society.

MR. G. T. WALKER, fellow and lecturer of Trinity College, Cambridge, has been appointed director-general of the Indian meteorological bureau.

LIEUTENANT MAX GENTY, known through numerous mathematical contributions, died at Toulon on October 24, aged 35 years.

THE name of the eminent Russian mathematician whose death was noticed on page 223 of the January number of the BULLETIN should have been printed Professor NIKOLAUS BUGAIEV.

RECENT catalogue of second-hand mathematical works : Fr. Strobel, Jena ; general science, including mathematics, 1012 titles.

NEW PUBLICATIONS.

I. HIGHER MATHEMATICS.

ABEL (N. H.).　Festskrift ved Hundredaarsjubilaeet for Niels Henrik Abels Födsel.　Christiania, 1902.　4to.　357 pp. 2 portraits, 6 facsimiles.　　　　　　　　　　　　　　　　　M. 14.50

ABHANDLUNGEN zur Geschichte der mathematischen Wissenschaften mit Einschluss ihrer Anwendungen, begründet von M. Cantor. Heft 14. Inhalt: A. A. Björno, Studien über Menelaos' Sphärik; Beiträge zur Geschichte der Sphärik und Trigonometrie der Griechen; H. Suter, Nachträge und Berichtigungen zu " Die Mathematiker und Astronomen der Araber und ihre Werke "; K. Bopp, Antoine Arnauld, der grosse Arnauld, als Mathematiker. Leipzig, Teubner, 1902.　8vo.　8 + 338 pp.

AHL (F.).　Untersuchungen über geodätische Linien.　Kiel, 1901.　8vo. 50 pp.　　　　　　　　　　　　　　　　　　　　　M. 1.50

BJÖRNO (A. A.).　See ABHANDLUNGEN.

BOPP (K.).　See ABHANDLUNGEN.

GEIGENMÜLLER (R.).　Leitfaden und Aufgabensammlung zur höheren Mathematik; für technische Lehranstalten und den Selbstunterricht bearbeitet.　Vol. I: Die analytische Geometrie der Ebene und die algebraische Analysis.　6te Auflage.　Mittweida, Polytechnische Buchhandlung, 1902.　8vo.　7 + 302 pp.　Cloth.　　M. 6.50