

made in a similar way as in the interpretation of the theorem of Ceva. It is easily found that *to a point and its corresponding conic in the plane correspond two curves of the third order on the hyperboloid which are symmetrical with regard to the center S.*

To the infinite points of the plane (pencils of parallel rays) and the parabolas inscribed to the fundamental triangle correspond the rectilinear elements of the hyperboloid.

6. From the above statement it is evident that the properties concerning the interpretation of the theorems of Ceva and Menelaos might be multiplied. In a similar manner we might interpret other relations of the triangle and thus obtain a special kind of surfaces whose properties are connected with the triangle. Such surfaces have been found by Rosace* and Steiner. Considered from this point of view, the investigations of Tucker, Taylor, McCay, Lemoine, Brocard, and others in the so-called "modern geometry of the triangle" would probably also lead to a number of valuable facts.†

BIEL, SWITZERLAND,
June, 1898.

NOTES.

A NEW list of members of the AMERICAN MATHEMATICAL SOCIETY will be published in January. Blank forms for furnishing necessary information have been sent to each member, and a full and prompt response is requested.

THE annual meeting of the London Mathematical Society was held on the evening of November 10th. LORD KELVIN consented to be nominated for the presidency, and Professors E. B. ELLIOTT and H. LAMB and Lieut.-Col. A. J. C. CUNNINGHAM for the vice-presidencies. The retiring members of the Council are Messrs. M. JENKINS and G. B. MATHEWS.

* Rosace, p. 170 of *J'intermédiaire des mathématiciens*, No. 8, vol. 4. The equation of this reference is

$$R^2(x + y + z)(x + y - z)(x - y + z)(-x + y + z) = x^2y^2z^2.$$

The equation of Steiner's surface mentioned above is

$$m(x^2 + 2xy + y^2) = xy(x + y + z)(x + y - z).$$

† See "Die moderne Dreiecksgeometrie," by Dr. E. Wölffing. *Umschau*, No. 45, vol. 1.

The former, who recently resigned the office of secretary after thirty years' tenure, thus severs his connection with the Council, on which he has served from (practically) its birth in 1865. President ELLIOTT took as the subject of his retiring address "Some secondary needs and opportunities of English mathematicians."

A CONFERENCE on the international catalogue of scientific literature was held recently in London, attended by delegates appointed from eighteen different countries. Professor FÉLIX KLEIN was the delegate from Germany, and among the representatives from France and Austria were Professors G. DARBOUX and L. BOLTZMANN. Dr. CYRUS ADLER, Librarian of the Smithsonian Institution, represented the United States.

For the "Encyklopädie der mathematischen Wissenschaften mit Einschluss ihrer Anwendungen" (see BULLETIN, 2d series, vol. 3, p. 326, vol. 4, p. 32, vol. 5, p. 109), projected by the academies of science of Göttingen, Munich, and Vienna, with Professors H. BURKHARDT and W. FR. MEYER as editors-in-chief, the following list of collaborators and subjects is announced:

Volume I: Arithmetic and Algebra, edited by W. FR. MEYER, of Königsberg.—*A. Arithmetic*: 1. Foundations of arithmetic, H. SCHUBERT, of Hamburg; 2. Permutations and combinations, E. NETTO, of Giessen; 3. Irrational numbers and convergence of infinite processes, A. PRINGSHEIM, of Munich; 4. Complex numbers, E. STUDY, of Greifswald; 5. Mengenlehre, A. SCHOENFLIES, of Göttingen; 6. Finite discrete groups, H. BURKHARDT, of Zürich; 7. Numerical reckoning, R. MEHMKE, of Stuttgart.—*B. Algebra*: 1. Foundations: *a, b.* Rational functions, E. NETTO, of Giessen; *c.* Algebraic forms, G. LANDSBERG, of Heidelberg; 2. Theory of invariants, W. FR. MEYER, of Königsberg; 3. Equations: *a.* Separation and approximation of the roots, C. RUNGE, of Hanover; *b.* Rational functions of the roots, K. TH. VALEN, of Königsberg; *c, d.* Galois' theory and its applications, O. HÖLDER, of Leipzig; *e.* Systems of equations, K. TH. VALEN, of Königsberg; *f.* Finite groups of linear substitutions, P. WIMAN, of Lund.—*C. Theory of numbers*: 1. Elementary theory of numbers, P. BACHMANN, of Weimar; 2. Theory of forms, K. TH. VALEN, of Königsberg; 3. Analytical theory of numbers, P. BACHMANN, of Weimar; 4. Algebraic numbers, D. HILBERT, of Göttingen; 5. Arithmetic theory of algebraic quantities, G. LANDSBERG, of Heidelberg; 6. Complex multipli-

cation, H. WEBER, of Strassburg.—*D.* Probabilities and Compensation of Errors: 1. Calculus of probabilities, E. CZUBER, of Vienna; 2. Calculus of compensations, 3. Interpolation, J. BAUSCHINGER, of Berlin; 4. Applications of the calculus of probabilities, L. V. BORTKEWITSCH, of Strassburg.—*E.* Calculus of differences, D. SELIWANOFF, of St. Petersburg.

Volume II: Analysis, edited by H. BURKHARDT, of Zürich.—*A.* Analysis of Real Quantities: 1. Principles of the infinitesimal calculus, A. PRINGSHEIM, of Munich; 2. Differential and integral calculus, A. VOSS, of Würzburg; 3. Definite integrals, G. BRUNEL, of Bordeaux; 4. Ordinary differential equations, P. PAINLEVÉ, of Paris; 5. Partial differential equations, E. v. WEBER, of Munich; 6. Continuous transformation groups, L. MAURER, of Tübingen; 7. Boundary conditions, *a.* Ordinary differential equations, M. BÔCHER, of Cambridge, Mass.; *b.* Partial differential equations of potential theory, H. BURKHARDT, of Zürich, and W. FR. MEYER, of Königsberg; *c.* Other partial differential equations, A. SOMMERFELD, of Clausthal; 8. Development in series, H. BURKHARDT, of Zürich, and A. SOMMERFELD, of Clausthal; 9. Calculus of variations, A. KNESER, of Dorpat.—*B.* Analysis of Complex Quantities: 1. General theory of functions, W. F. OSGOOD, of Cambridge, Mass.; 2. Algebraic functions and their integrals, W. WIRTINGER, of Innsbruck; 3. Definite integrals, 4. Linear differential equations, H. BURKHARDT, of Zürich; 4*b.* Spherical harmonics and similar functions, A. WANGERIN, of Halle; 5. Non-linear differential equations, P. PAINLEVÉ, of Paris; 6. Inverse functions, *a.* Elliptic functions, J. HARKNESS, of Bryn Mawr, Pa.; *b.* Abelian functions, W. WIRTINGER, of Innsbruck; *c.* Automorphic functions, R. FRICKE, of Braunschweig; 7. Theta functions, A. KRAZER, of Strassburg, and W. WIRTINGER, of Innsbruck; 8. Functional equations and operations, S. PINCHERLE, of Bologna.

Volume III: Geometry, edited by W. FR. MEYER, of Königsberg.—*A.* Pure Geometry: 1. Principles of geometry, F. ENRIQUES, of Bologna; 2. Elementary geometry, M. SIMON, of Strassburg in E.; 3. Partitions and configurations of space, H. STEINITZ, of Berlin; 4. Analysis situs, G. BRUNEL, of Bordeaux; 5. Foundations of projective geometry, A. SCHOENFLIES, of Göttingen; 6. Descriptive geometry, C. RODENBERG, of Hanover; 7. Geometry of inversion, H. BURKHARDT, of Zürich.—*B.* Foundations of the Application of Algebra and Anal-

ysis to Geometry: 1. Fundamental questions, 2. Methods of coördinates, A. SCHOENFLIES, of Göttingen; 3. Geometrical analysis, H. BURKHARDT, of Zürich.—*C.* Algebraic Geometry: 1. Conic sections, F. DINGELDEY, of Darmstadt; 2. General theory of higher algebraic curves, K. ROHN, of Dresden; 3. Special algebraic curves, G. KOHN, of Vienna; 4. Surfaces of the second order, O. STAUDE, of Rostock; 5. General theory of higher algebraic surfaces, G. CASTELNUOVO, of Rome, and F. ENRIQUES, of Bologna; 6. Special algebraic surfaces, W. FR. MEYER, of Königsberg; 7. Spaces of higher dimensions, C. SEGRE, of Turin; 8. Algebraic transformations and correspondences, G. CASTELNUOVO, of Rome, and F. ENRIQUES, of Bologna; 9. Geometry of higher space elements, E. WÄLSCH, of Brünn; 10. Enumerative methods, H. G. ZEUTHEN, of Copenhagen.—*D.* Differential Geometry: 1, 2. Applications of the infinitesimal calculus to curves and surfaces, H. v. MANGOLDT, of Aachen; 3. Curves on surfaces, R. v. LILIENTHAL, of Münster; 4. Particular transcendental curves, G. SCHEFFERS, of Darmstadt; 5. Special transcendental surfaces, R. v. LILIENTHAL, of Münster; 6. Development and representation of two surfaces on each other, A. VOSS, of Würzburg; 7. Contact transformations, G. SCHEFFERS, of Darmstadt; 8. Form of curves that are defined by differential equations, W. DYCK, of Munich; 9. Differential line geometry, E. WÄLSCH, of Brünn; 10. Differential geometry of manifolds of higher dimensions, P. STÄCKEL, of Kiel.

The above three volumes constitute the part of the work devoted to pure mathematics. The second part occupied with applied mathematics will be edited, with the coöperation of FELIX KLEIN, by H. BURKHARDT for subjects in astronomy and geophysics, by A. SCHOENFLIES for mechanics, and by A. SOMMERFELD for physics and physical technology. W. FR. MEYER is to prepare a concluding volume containing the questions of history, philosophy and pedagogy, and a general register of the complete work.

THE MATHEMATISCHE ANNALEN has issued an elaborate general register, prepared by Professor A. SOMMERFELD, of Clausthal, of the first fifty volumes of this journal. The register contains over two hundred pages and is accompanied by a portrait of Alfred Clebsch who, together with Professor Carl Neumann, of the University of Leipzig, founded the *Annalen* in 1868. The first fifty volumes contain fifteen hundred and fifty papers written by three hundred and thirty-two authors. Of these papers, four hundred

and eighteen are devoted to arithmetic and algebra, six hundred and twenty-eight to analysis, five hundred and fifty-one to geometry, eighty-six to applied mathematics and seventeen to the history of mathematics. Of the authors, two hundred and nine are from Germany, twenty-seven from Austria, twenty-two from Italy, eighteen from Russia, fifteen from France, nine from Switzerland, seven from England, seven from the United States, five from Norway and Sweden, five from Denmark, four from Holland, one each from Belgium, Greece, Servia, and Spain. These facts are drawn from the extensive table of statistics which concludes the register. The great utility and convenience of this register to mathematicians is indicated by its three-fold classification of the material, 1° relative to the authors' names arranged in alphabetical order, 2° with regard to subjects under sixty-seven different headings, 3° volume by volume.

THE last list of announcements of the Cambridge University Press includes the following mathematical works: "Collected mathematical papers," by Professor P. G. TAIT; "The scientific papers of John Couch Adams," volume 2, edited by Professors W. G. ADAMS and R. A. SAMPSON; "A treatise on octonions," a development of Clifford's bi-quaternions, by Professor ALEXANDER MCAULAY; "On the kinetic theory of gases," by Mr. S. H. BURBURY, F.R.S.; "A treatise on spherical astronomy," by Professor ROBERT S. BALL, F.R.S.; "A treatise on geometrical optics," by Mr. R. A. HERMAN; "A treatise on the dynamics of a particle," by Dr. E. J. ROUTH, F.R.S.

THE second edition of a "Catalogue of scientific and technical periodicals," by Professor H. C. BOLTON has just been published by the Smithsonian Institution.

L'Éducation Mathématique, which made its initial appearance with the beginning of the present academic year, promises to be a worthy addition to the list of excellent elementary mathematical journals now issued in Paris. Under the editorship of Professors J. GRIESS and H. VUIBERT, it is addressed primarily to students of the classes in letters. It is to be published in quarto form twice a month during the period from October to July inclusive and its office of publication is 17 rue des Écoles, Paris.

"Les savants modernes. Leur vie et leurs travaux, d'après les documents académiques choisis et abrégés par A. REBIÈRE. Un vol. in 8° orné de 40 portraits" is announced

to be in the press of Nony et C^{ie}, of Paris. The volume is to consist of four parts devoted respectively to the academy of sciences, mathematicians and astronomers, physicists and chemists, and naturalists. The mathematicians and astronomers given a place are the following : Cassini, Huygens, Newton, Leibnitz, the Bernouillis, Euler, Clairaut, d'Alembert, Lagrange, Herschel, Monge, Laplace, Delambre, Legendre, Carnot, Fourier, Gauss, Poncelet, Cauchy, Chasles, LeVerrier, while Ampère, Malus and Fresnel are among the names appearing in the third section of the book.

THE Hinrichs press of Leipzig announces a memoir by Professor JAMES A. CRAIG, of the University of Michigan, on the astrological-astronomical tablets of the Kujundjik (Nineveh) collection of the British Museum, known as the Illumination of Bêl. This very important series, numbering about one hundred and thirty tablets, is here edited for the first time.

OXFORD UNIVERSITY. The following courses of lectures in mathematics are offered for the current Michaelmas term :—Professor ELLIOTT : Theory of numbers, two hours; Differential invariants and reciprocants, one hour.—Professor TURNER : Elementary mathematical astronomy, two hours.—Professor ESSON : Analytic theory of plane curves, two hours; Synthetic theory of plane curves, one hour.—Mr. C. E. HASELFOOT : Algebra, two hours.—Mr. A. E. JOLLIFFE : Series and continued fractions, two hours.—Mr. C. LEUDESORF : Projective geometry (elementary), three hours.—Mr. J. W. RUSSELL : Pure geometry, two hours; Introduction to higher algebra, one hour.—Mr. C. H. SAMPSON : Analytical geometry, two hours.—Mr. E. H. HAYES : Elementary mechanics, two hours.—Mr. A. L. PEDDER : Problems in pure mathematics, two hours.—Mr. J. E. CAMPBELL : Differential equations, three hours.—Mr. C. H. THOMPSON : Dynamics of a particle, two hours.—Mr. A. L. DIXON : Hydrostatics, one hour.—Mr. H. T. GERANS : Rigid dynamics, two hours.

PROFESSOR EDGAR W. BASS, professor of mathematics in the United States Military Academy at West Point, after a twenty years' tenure of the position, has been placed on the retired list.

DR. ADAM NELL, professor of mathematics in the Darmstadt Technical Institute, has retired at the age of seventy-four years.

PROFESSOR O. HÖLDER, of the University of Königsberg,

has accepted a call to a professorship in mathematics at the University of Leipzig, and will begin lecturing at the latter university in the summer semester of 1899.

DR. R. HAUSSNER has been appointed professor of mathematics at the University of Giessen. PROFESSOR E. WÄLSCH has been promoted to a professorship of mathematics in the Technical Institute at Brünn. DR. JOSEPH WELLSTEIN has qualified as privat docent in mathematics at the University of Strassburg.

MR. LUTHER M. DEFOE has been made assistant professor of mathematics in Missouri State University. MR. T. C. ESTEY has been appointed instructor in mathematics in Amherst College. MR. W. L. SNOW and MR. G. M. JONES have been appointed to instructorships in mathematics in Boston University and Oberlin College, respectively.

DR. W. NYLAND has been promoted to a professorship of astronomy in the University of Utrecht.

By a recent decree of the Belgian government its astronomical service is separated from the meteorological service; PROFESSOR C. LAGRANGE has been made director of the former.

HENRY PERIGAL, ESQ., author of various kinematical and astronomical works, died recently in London at the age of ninety-seven years.

PROFESSOR W. LECONTE STEVENS, of the Rensselaer Polytechnic Institute, has accepted the chair of physics in Washington and Lee University. Professor G. W. PATTERSON, of the department of physics at the University of Michigan, has been granted a year's leave of absence. MR. C. D. CHILDS has been made professor of physics at Colgate University. The professorship of physics in Union College, vacated by MR. F. F. THOMPSON to accept a position in Pennsylvania State College, has been filled by the appointment of Professor H. T. EDDY, of the University of Minnesota. DR. RICHARD WACHSMUTH has been called from the University of Göttingen to an assistant professorship of physics in the University of Rostock. DR. S. J. BARNETT has been appointed instructor in physics in Colorado College, and MR. R. R. LAWRENCE, to a similar position in the Massachusetts Institute of Technology.

DR. PAUL TANNERY contributes to the October number of the *Revue Philosophique* a general review of "The theory of mathematical knowledge according to recent works," bas-

ing his interpretation on Laisant's "La mathématique, philosophie, enseignement," Whitehead's "Treatise on universal algebra, with applications," and Russell's "Essay on the foundations of geometry."

It is proposed to erect a suitable memorial to JAMES CLERK MAXWELL, in the parish church of Corsock, of which he was a trustee and elder. Subscriptions will be received by the Rev. George Sturrock, The Manse, Corsock by Dalbeattie, N. B.

MR. CHARLES A. SCHOTT, chief of the computation division of the U. S. Coast and Geodetic Survey, has been awarded the Wilde prize of the French Academy for his work in terrestrial magnetism.

MR. HAROLD HILTON has been given a mathematical fellowship at Magdalen College of Oxford University.

A travelling fellowship in mathematics available for the purpose of study in Germany has been founded at the University of Paris by an anonymous donor.

A NEW class of fellowships has been created this at year Cornell University. Those holding the degree of doctor of philosophy may obtain these fellowships, which carry no emolument, but all university privileges.

NEW PUBLICATIONS.

I. HIGHER MATHEMATICS.

- BALDAUF (G.). Ueber die Punkte kleinster Summe der absoluten Abstände von n Geraden. Plauen, 1898. 4to. 30 pp. M. 1.80
- CHEMIN (O.). See SALMON (G.).
- CZUBER (E.). Vorlesungen über Differential- und Integralrechnung. Band II: Integralrechnung. Leipzig, Teubner, 1898. 8vo. 9 and 428 pp. Cloth. M. 10.00
- FIEDLER (W.). See SALMON (G.).
- FORT (O.) und SCHLÖMILCH (O.). Lehrbuch der analytischen Geometrie. Theil II: analytische Geometrie des Raumes, von O. Schlömilch. 6te Auflage von R. Heger. Leipzig, Teubner, 1898. 8vo. 8 and 338 pp. M. 5.00
- FUHRMANN (W.). Beiträge zur Transformation algebraisch-trigonometrischer Funktionen. Königsberg, 1898. 4to. 12 pp. M. 1.20
- GRÜNFELD (E.). Zur Theorie der algebraischen auflösbaren Gleichungen. Nikolsburg, 1898. 8vo. 11 pp. M. 1.00