NOTES.

AT the regular meeting of the London mathematical society held on February 14, 1901, the following papers were read: "The distribution of velocity and the equations of the stream lines due to the motion of an ellipsoid in fluid frictionless and viscous," by Mr. T. STUART; "On factorizable twin binomials," by Lieut. Col. A. J. CUNNINGHAM; "Concerning the abelian and related linear groups," by Professor L. E. DICKSON; "A geometrical theory of differential equations of the first and second orders," by Mr. R. W. HUDSON; "Brocardal properties of some associated triangles," by Mr. R. TUCKER; "A note on stability, with a hydrodynamical application," by Mr. T. J. I'A. BROMWICH; "Remarks on notation in Lie's theory of continuous groups, and on Schur's determination of a continuous group of given structure, with remarks on Mr. J. E. CAMPBELL'S paper (read at the January meeting)," by Mr. H. F. BAKER; "Note on curves similar and parallel to one another," by Mr. D. B. MAIR.

THE publication of the works of WEIERSTRASS, which the Prussian academy of sciences has undertaken, has been unexpectedly delayed, and little progress has been made during the past year. About three-quarters of volume IV. (Abelian functions) has now been printed.

THE first number (1901) of the *Annuaire des mathématiciens*, published by Messrs. Carré and Naud, of Paris, is in press, and will soon appear. It will contain about 7,000 names with addresses, a list of the principal mathematical societies, and a list of mathematical periodicals. Besides this, the volume will contain certain scientific notices; among the authors of these notices will probably be Professors P. APPELL, GINO LORIA, D. HILBERT, F. KLEIN, C. MÉRAY, J. PETERSEN, and P. H. SCHOUTE. The preface will be by Dr. C A. LAISANT, editor of *L'Enseignement mathématique*, to whom the publication of the volume is due.

THE Prussian academy of sciences has received the sum of 100,000 marks from the city of Berlin. The money was given at the celebration of the two hundredth anniversary of the academy, and the interest on it is to be applied at intervals of four years to an important investigation in the field of the natural sciences. The first award is to be made in 1904.

CAMBRIDGE UNIVERSITY.—The Adams prize for 1901 has been awarded to H. M. MACDONALD, fellow of Clare, for an essay on "Electric waves." The subject for the Adams prize in 1903 is: "The bearing on mathematical physics of recent progress in the theory of the representation of discontinuous quantity by series, with special consideration of the logical limitations of the processes involved." The prize is open to the competition of all who have received a degree from the university. The successful candidate will receive about £225. Essays are to be sent to the vice-chancellor by December 16, 1902.

THE Naples academy of mathematical and physical science has awarded its mathematical prize of 1,000 lire for 1899 to Dr. G. TORELLI, professor at Palermo. The subject was the totality of prime numbers. The theme for the next award is the theory of invariants of the ternary biquadratic, considered preferably in relation to the condition for splitting into lower forms. The essays may be written in Italian, French, or Latin, and must be sent in, distinguished by a motto, before March 31, 1902.

THE royal academy of sciences of Turin reannounces the conditions made public January 1st, 1899, for its Bressa prize. The competition is open to the world and closes December 31st, 1902. The prize will be conferred on the discoverer of the most useful invention or the author of the most celebrated work in the mathematical and physical sciences, not excluding geology, history, geography and statistics. The value of the prize is nine thousand six hundred francs.

THE Madrid academy of sciences calls for a historical memoir on the Spanish mathematicians of the sixteenth century for its next annual prize in the mathematical sciences. Biographies and exhaustive accounts of works both published and unpublished are demanded.

UNIVERSITY OF OXFORD. The following announcements are those for the Hilary term 1901 in the mathematical sciences, the courses consisting in general of two lectures per week :—By Professor W. ESSON : Synthetic geometry of conics ; Synthetic geometry of cubics.—By Professor E. B. ELLIOTT : Elements of elliptic functions ; Supplementary lectures on quantics.—By Professor H. H. TURNER : Elementary mathematical astronomy.—By Professor A. E. H. LOVE : Dynamics ; Fourier's series and its physical applications.—By Mr. A. L. DIXON : Calculus of finite dif-

ferences.—By Mr. J. E. CAMPBELL: Algebra of quantics. —By Mr. P. J. KIRBY: Solid geometry.—By Mr. C. H. THOMPSON: Dynamics of a particle.—By Mr. E. H. HAYES: Geometrical optics.—By Mr. C. E. HASELFOOT: Physical optics.—By Mr. H. T. GERRANS: Hydrodynamics. By Mr. J. W. RUSSELL: Pure geometry.—By Mr. C. LEUDESDORF: Geometry (Maxima and minima, inversion, etc.).

UNIVERSITY OF PARIS. The following courses in the mathematical sciences are announced for the second semester at the faculty of sciences, the semester opening March 1st, 1901, and each course consisting of two lectures per week :—By Professor É. PICARD: Algebraic functions and the transcendents associated with them. The introductory lecture to the course is devoted to the scientific work of Hermite; this lecture will appear in the current volume of the *Annales de l'École Normale.*—By Professor E. GOURSAT: Differential equations.—By Professor P. APPELL: Continuation of the course of the first semester in mechanics.—By Professor J. BOUSSINESQ: Continuation of the course of the preceding semester in mathematical physics.—By Professor G. KOENIGS: Study of machines. —By M. C. BOURLET, replacing Professor L. RAFFY: Differential equations and their applications to mechanics and physics.—By Professor J. HADAMARD and M. M. SERVANT: Conferences on infinitesimal calculus.—By Professor P. PUISEUX: Conferences on mechanics and astronomy.—By Professor J. HADAMARD and MM. H. ANDOYER and E. BLUTEL: Conferences on the subjects for the agrégation.

THE several German universities below offer during the summer semester 1901 courses in mathematics as follows:

UNIVERSITY OF BRESLAU.—By Professor J. ROSANES: Plane analytic geometry, four hours; Theory of determinants, two hours; Seminar, one hour.—By Professor R. STURM: Theory of geometrical relationship, part one, three hours; Higher algebraic curves, three hours; Seminar on descriptive geometry, two hours.—By Professor J. FRANZ: The problem of three bodies, two hours; Calculus of finite differences, with applications to special perturbations of the heavenly bodies, four hours.—By DR. F. LONDON: Definite integrals, three hours; Mathematics of insurance, two hours.

UNIVERSITY OF ERLANGEN.—By Professor P. GORDAN: Theory of differential equations, four hours; Theory of

invariants, four hours; Seminar, three hours.—By Professor M. NOETHER; Differential and integral calculus, II, four hours; Descriptive geometry, with exercises, two hours; Selected chapters in mechanics, two hours.

UNIVERSITY OF FREIBURG.—By Professor J. LÜROTH: Theory of functions, five hours; Theoretical astronomy, two hours.—By Professor L. STICKELBERGER: Integral calculus, four hours; Higher plane curves, three hours; Seminar.—By Dr. A. LOEWY: Algebraic equations, four hours; Foundations of geometry, two hours.—By Dr. E. REBMANN: Elements of projective geometry, two hours.

UNIVERSITY OF GIESSEN.—By Professor M. PASCH: Foundations of geometry, four hours; Elements of algebra, two hours; Mathematical seminar, one hour.—By Professor E. NETTO: Plane analytic geometry, four hours; Introduction to the theory of functions, two hours; Seminar, one hour.—By Professor R. HAUSSNER: Differential geometry, with exercises, five hours; Technical mechanics, second part, with exercises, four and one half hours.

UNIVERSITY OF GREIFSWALD.—By Professor W. THOMÉ: Mechanics II, four hours; Theory of potential, four hours; Seminar, two hours.—By Professor E. STUDY: Analytic geometry I, four hours; Introduction to synthetic geomtry, two hours; Select chapters in the theory of functions, one hour; Seminar, one hour.

UNIVERSITY OF HEIDELBERG.—By Professor L. KOENIGSBERGER: Infinitesimal calculus, four hours; Theory of functions, four hours; Seminar, two hours.—By Professor M. CANTOR: Algebraic analysis, four hours; Arithmetic and algebra, three hours.—By Professor K. KOEHLER, Analytic geometry, three hours.—By Professor G. LANDSBERG: Theory of determinants, two hours; Algebraic curves, two hours.—By Dr. K. BOEHM: Introduction to the theory of continuous transformation groups, with applications to geometry and differential equations, one or two hours; Gauss's memoir on general theory of forces attracting or repelling as the inverse square of distance, one hour.

UNIVERSITY OF JENA.—By Professor J. THOMAE: Differential equations, four hours; Plane analytic geometry, four hours.—By Professor A. GUTZMER: Differential calculus, five hours; Theory of potential, four hours; Seminar.—By Professor G. FREGE: The foundations of arithmetic, four hours; Mathematical evercises, two hours.

UNIVERSITY OF KIEL.—By Professor L. POCHHAMMER: Introduction to algebra and determinants, four hours; Theory of elliptic functions, four hours; Seminar, one hour. —By Professor P. STÄCKEL: Infinitesimal calculus and introduction to analysis, four hours; Advanced dynamics of rigid bodies, four hours; History of mathematics since the Renaissance, one hour; Seminar, one hour.

UNIVERSITY OF KOENIGSBERG.—By Professor F. MEYER: Introduction to the theory of numbers, four hours; Seminar, one hour.—By Professor A. SCHOENFLIES: Differential geometry of curves and surfaces, four hours; Seminar, one hour.—By Professor L. SAALSCHÜTZ: Differential calculus, four hours, with seminar one hour; Gauss's trigonometric and other interesting series, two hours.—By Dr. J. RAHTS: Higher geodesy, two hours; Least squares, two hours.—By Dr. T. VAHLEN: Analytic geometry of the plane and of space, four hours, with exercises, one hour.—By Dr. E. MÜLLER: Introduction to descriptive geometry, two hours.

UNIVERSITY OF LEIPSIC: By Professor C. NEUMANN: Theory of potential and spherical harmonics, four hours; Seminar, two hours.—Professor A. MAYER: Courses to be announced later.—By Professor O. HÖLDER: Ordinary differential equations, four hours; Scientifically rigorous foundation of arithmetic, one hour; Seminar, one hour.— By Professor F. ENGEL: Analytic geometry of the plane and of space, four hours; Differential invariants (continued), one hour; Projective geometry and theory of invariants (continuation of projective geometry), two hours; Seminar, with Dr. G. Kowalewski, one hour.—By Dr. F. HAUSDORFF: Differential geometry, four hours; Mengenlehre, two hours.—By Dr. G. KOWALEWSKI; Algebraic analysis, four hours, with exercises, one hour; Line geometry, two hours; Seminar on differential invariants with Professor Engel, one hour.—By Dr. H. LIEBMANN: Algebraic equations, two hours; Synthetic geometry of conics, two hours; Selected chapters in the theory of numbers, one hour.

UNIVERSITY OF MARBURG.—By Professor F. SCHOTTKY: Infinitesimal calculus, four hours; Calculus of variations, two hours; Seminar, four hours.—By Professor E. HESS: Analytic and synthetic treatment of plane geometry, four hours; Integration of differential equations, three hours; Selected chapters on applied mechanics, two hours; Seminar, four hours.—By Dr. F. v. DALWIGK: Introduction to

mathematics for chemists, three hours, with exercises, one hour; Collineation and perspective, two hours.

UNIVERSITY OF STRASSBURG.—By Professor T. REYE: Selected chapters on higher synthetic geometry, three hours; Theory of forces which attract according to Newton's law, (theory of potential), three hours; Seminar, two hours.—By Professor H. WEBER: Theory of abelian functions, four hours; Applications of elliptic functions to mechanics and physics, two hours; Seminar, two hours.—By Professor G. ROTH: Differential and integral calculus, three hours, with exercises, two hours; Plane analytic geometry, three hours.—By Professor A. KRAZER: Definite integrals, three hours; Analytic geometry of space, three hours; Theory of the theta functions, two hours; Seminar, one hour.—By Dr. E. TIMERDING: Theory of surfaces, two hours.—By Dr. J. WELLSTEIN: Descriptive geometry, II, two hours.

UNIVERSITY OF TÜBINGEN.—By Professor A. v. BRILL: Analytic geometry of space, three hours; Theory of curvature of surfaces, four hours; Seminar, in two sections, two hours.—By Professor H. STAHL: Elementary analysis, three hours, with exercises, one hour; Higher analysis, I (differential calculus), four hours, with exercises, one hour.—By Professor L. MAURER: Synthetic geometry, two hours, with exercises, one hour; Descriptive geometry, I, two hours, with exercises, two hours.

UNIVERSITY OF WÜRZBURG.—By Professor F. PRYM: Integral calculus, six hours, with exercises, two hours; Seminar on topics in the theory of functions, two hours.—By Professor A. VOSS: Analytic and synthetic geometry of conics, four hours; Analytic mechanics, four hours; Seminar on topics in higher mathematics, two hours.—By Professor E. SELLING: Partial differential equations of mathematical physics, four hours; Theory of planetary motions, three hours.

UNIVERSITY OF ZURICH.—By Professor H. BURKHARDT: Algebraic analysis, four hours; Partial differential equations, four hours; Seminar, two hours.—By Professor A. WEILER: Analytic geometry, II, two hours; Descriptive geometry, II, two hours; Map projection, two hours; Synthetic geometry, II, two hours.

THE dedication of the monument to FRANCESCO BRIOSCHI took place on December 13, 1900, the third anniversary of

his death. The monument, which is of bronze, has been placed in the Royal Technical Institute of Milan. It is the work of the sculptor L. Secchi, of Milan, and was erected with a part of the money collected by subscription from the friends, admirers, and pupils of BRIOSCHI. At the inauguration addresses were made by Professors G. COLOMBO, P. BLASERNA, G. CELORIA, and G. BARDELLI. These addresses are published in the *Annali di Matematica* for January, 1901 (3d series, volume V., page 141).

OWING to the state of his health, Professor P. G. TAIT of the chair of natural philosophy in the University of Edinburgh, has intimated his approaching resignation, after a distinguished service of over forty years.

DR. J. W. L. GLAISHER has been elected president of the Royal astronomical society of Great Britain for the forthcoming year. The honorary secretaries are Messrs. F. W. DYSON and E. T. WHITTAKER, and the foreign secretary is, as before, Sir WILLIAM HUGGINS. The gold medal of the society was this year awarded to Professor E. C. PICKERING, of Harvard University.

PROFESSOR A. PRINGSHEIM has been promoted to a full professorship in the University of Munich.

PROFESSOR M. CANTOR has been chosen corresponding member of the Royal institute of science, letters, and art of Venice.

IN justice to Professor C. N. LITTLE, whose resignation from the faculty of the Leland Stanford Jr. University was noted in the preceding number of the BULLETIN, it is proper to state that Professor Little's resignation was tendered voluntarily as an expression of disapproval of the administrative policy of the university.

PROFESSOR D. E. SMITH, principal of the Brockport, N. Y., State normal school, has accepted a call to the professorship of mathematics in Teachers College, Columbia University, and will enter upon the duties of his new position at the beginning of the next academic year.

MISS E. F. PENDLETON, instructor in mathematics at Wellesley College, has been elected dean of the college. Miss HELEN MERRILL has been promoted to an associate professorship of mathematics. Miss R. H. VIVIAN, alumnæ fellow in mathematics at the University of Pennsylvania, has been appointed instructor in mathematics at Wellesley.

DR. G. A. MILLER, of Cornell University, has been appointed to an assistant professorship of mathematics at Leland Stanford University.

DR. O. SCHLÖMILCH, formerly professor of mathematics at the Technical School at Dresden, died on February 7th, at the age of seventy-eight years.

PROFESSOR CHARLES MCDONALD, died at Halifax, N. S., on March 10th, after a service of over thirty years in Dalhousie College.

DR. J. M. RICE died at Northboro, Mass., on March 2d, aged sixty-eight years. He was appointed professor of mathematics at the Naval academy at Annapolis in 1870.

PROFESSOR G. P. STARKWEATHER, of Yale University, died on March 21st, at the age of twenty-eight years.

THE library of the late Professor E. B. CHRISTOFFEL is offered for sale by Gustav Fock of Leipzig.

NEW PUBLICATIONS.

I. HIGHER MATHEMATICS.

BELTRAMI (L.). Francesco Brioschi: nel giorno della morte; un anno dopo; davanti al monumento, dicembre 1900. Milano, Allegretti, 1900. 8vo. 36 pp., portrait.

BÔCHER (M.). The theory of linear dependence. Salem, Mass., Salem Press, 1901. 4to. 16 pp. (From the *Annals of Mathematics*, second series, Vol. 2.)

BORINI (B.). I continuanti. Forli, Medri, 1900. 4to. 117 pp.

BOSWORTH (A. L.). Begründung einer vom Parallelenaxiome unabhängigen Streckenrechnung. (Diss.) Göttingen, Dietrich, 1900. 8vo. 57 pp.

GMEINER (J. A.). See STOLZ (O.).

HALSTED (G. B.). Gauss and the non-euclidean geometry. 11 pp. (From *Science*, new series, Vol. 12, pp. 842–846.)

HAENTZSCHEL (E.). Über die verschiedenen Grundlegungen in der Trigonometrie. (Progr.) Berlin, 1900. 4to. 31 pp.