NOTES.

THE San Francisco Section of the AMERICAN MATHEMAT-
ICAL SOCIETY held its fall meeting at the University of Cali-
fornia, on Saturday, October 1. The preliminary programme
included a conference on recent investigations in the founda-
tions of geometry.

THE General Index of the first thirteen volumes of the
BULLETIN, 1891–1904, compiled by Dr. EMILIE N. MARTIN,
is now in press. The book, of eighty pages, contains an index
by authors, index of works reviewed, an elaborate subject index,
and an index of authors of papers read before the Society since
1891.

THE July number (volume 5, number 3) of the *Transactions*
of the AMERICAN MATHEMATICAL SOCIETY contains: "The
convergence of algebraic continued fractions whose coefficients
have limiting values," by E. B. VAN VLECK; "The Sylow sub-
groups of the symmetric group," by W. FINDLAY; "On the
smaller perturbations of the lunar arguments," by E. W.
BROWN; "Sets of independent postulates for the algebra of
logic," by E V. HUNTINGTON; "On the order of linear
homogeneous groups (second paper)," by H. F. BLICHFELDT;
"Algebras defined by finite groups," by J. B. SHAW; "A
system of axioms for geometry," by O. VEBLEN.

THE July number (volume 26, number 3) of the *American
Journal of Mathematics* contains: "Bemerkungen zu Herrn
D. N. Lehmer's Abhandlung in Bd. 22 dieses Journals, S.
293–335," by E. LANDAU; "On hypercomplex number sys-
tems in seven units," by H. E. HAWKES; "Memoir on abelian
transformations," by L. E. DICKSON.

THE concluding (July) number of volume 5 of the *Annals of
Mathematics* contains: "Some elementary theorems concerning
the steady flow of electricity in solid conductors," by B. O.
PEIRCE; "On a linear transformation and some systems of
hypocycloids," by R. E. ALLARDICE; "On the integral divi-
sors of $a^n - b^n$," by G. D. BIRKHOFF and H. S. VANDIVER;
"Two elementary constructions in complex trigonometry," by
A. E. KENNELLY; "Note on Stirling's formula," by S. A.
COREY; "Note on Sylow's theorem," by G. A. MILLER;

"The conditions for a plait point," by P. SAUREL; "Acknowl-edgment," by P. SAUREL.

THE British association for the advancement of science met at Cambridge University on August 17, 1904, the opening ad-dress being delivered by prime minister ARTHUR BALFOUR. The president of section A (mathematical and physical sciences) was Professor HORACE LAMB. The papers in this sec-tion were devoted almost exclusively to applied mathematics and to physics. The opinion was expressed in prominent quarters that the modern development of pure mathematics was such as to demand a further division of the section in the near future, there being already two subsections, one devoted to physics and the other to astronomy. Among the recipients of the honorary degree of doctor in science from Cambridge Uni-versity, on the occasion of the meeting, was Major P. A. MAC-MAHON, one of the general secretaries of the Association. From the field of applied mathematics, Professor VITO VOL-TERRA of Rome and Sir DAVID GILL, astronomer royal at Cape Town, were similarly honored. The next meeting of the association will be held at Cape Town in August, 1905, under the presidency of G. H. DARWIN.

AT the meeting of the National educational association at St. Louis on June 28, a mathematical conference was held for the consideration of questions relating to secondary mathematical instruction. At the close of the general meeting, at which sev-eral papers were read and discussed, a special meeting of the mathematical teachers of Missouri was held, in response to a circular previously sent out, for the consideration of the advis-ability of forming an association of the mathematical teachers of the state. It is presumed that a permanent organization will be effected at the time of the next meeting, which will be held at Columbia, Missouri, during the Christmas vacation.

THE annual list of American doctorates published in *Science* presents for the past academic year 281 names, of which 128 are credited to the sciences. The following 13 successful can-didates offered mathematics as major subject (the titles of the dissertations are appended): L. D. AMES, Harvard, "An arith-metic treatment of some problems in analysis situs;" C. E. BROOKS, Johns Hopkins, "Orthic curves, or algebraic curves which satisfy Laplace's equation in two dimensions;" W. H. BUSSEY, Chicago, "Generational relations for the abstract group

simply isomorphic with the linear fractional group;" W. B. CARVER, Johns Hopkins, "On the Cayley-Veronese class of configurations;" A. C. LUNN, Chicago, "The differential equations of dynamics;" C. S. FORBES, Columbia, "Geometry of circles orthogonal to a given sphere;" J. N. GATES, Clark, "Cubic and quartic surfaces in four-fold space;" W. A. MANNING, Stanford, "Studies on the class of primitive substitution groups;" C. L. E. MOORE, Cornell, "On the quadratic spherical complex;" VIRGINIA RAGSDALE, Bryn Mawr, "On the arrangement of the real branches of plane algebraic curves;" BURKE SMITH, Yale, "On surfaces which may be deformed with preservation of a conjugate system of curves;" CLARA E. SMITH, Yale, "Representation of an arbitrary function by means of Bessel's functions;" J. W. YOUNG, Cornell, "On the group of sign $(0, 3 ; 2, 4, \infty)$ and the functions belonging to it." The number of American doctorates in mathematics for each year from 1898 to 1904 is 11, 13, 11, 18, 8, 7, 13.

AN effort is being made to establish a society for the study of the history of the natural and technical sciences. The subject was presented at the third international congress of mathematics at Heidelberg last August, and also at the congress of philosophy (section on the history of sciences) at Geneva in September, and attracted favorable attention. Those who are interested in the founding of such a society are asked to communicate at an early date with Ingenieur F. M. Feldhaus, Rohrbach-Heidelberg, Germany.

THE American universities below offer during the academic year 1904–1905 advanced courses in mathematics as follows:

UNIVERSITY OF MICHIGAN. — By Professor W. W. BEMAN: Solid analytic geometry, first semester, two hours; Differential equations, first semester, three hours; Quaternions, second semester, two hours; Advanced calculus, two hours; Linear differential equations, second semester, two hours.—By Professor A. ZIWET: Projective geometry, three hours; Advanced mechanics, second semester, three hours; Theory of potential, first semester, three hours. — By Professor J. L. MARKLEY: Theory of functions, three hours. — By Professor J. W. GLOVER; Higher algebra, three hours; Theory of annuities and insurance, two hours. — By Dr. A. B. PIERCE: Differential geometry, three hours. — By Mr. E. B. ESCOTT: Theory of numbers, two hours.

STATE UNIVERSITY OF OHIO. — By Professor R. D. BOHAN-NAN: General theory of functions, three hours; Elliptic functions, two hours. — By Professor K. D. SWARTZEL: Potential function, two hours; Infinite series, two hours. — By Professor H. W. KUHN: Higher plane curves, two hours; Theory of groups, two hours. — By Professor E. F. CODDINGTON: Theory of equations, two hours; Determinants, two hours. — By Professor C. Z. ARNOLD: Differential equations, three hours.

THE various foreign universities below offer during the winter semester of 1904–1905 courses in mathematics as follows:

CAMBRIDGE UNIVERSITY. — *Michaelmas term,* 1904. — By Professor A. R. FORSYTH: Continuous groups, three hours. — By Professor G. H. DARWIN: Figure of the earth and precession, three hours. — By Professor Sir R. S. BALL: Planetary theory, three hours. — By Professor J. LARMOR: Electricity and magnetism, three hours; Mathematical physics II, three hours. — By Professor J. J. THOMSON: Properties of matter, two hours; Electricity and matter, two hours. — By Professor B. HOPKINSON: Applied mathematics, two hours; Electricity, two hours. — By Dr. E. W. HOBSON: Theory of aggregates and theory of functions of a real variable, three hours.—By Dr. H. F. BAKER: Introduction to theory of functions, three hours; Solid geometry, three hours. — By Mr. G. B. MATHEWS: Projective geometry, three hours — By Mr. H. W. RICHMOND: Analytic geometry of curves, three hours. — By Mr. H. M. MACDONALD: Waves (especially of light), three hours. — By Mr. A. N. WHITEHEAD: Symbolic logic and its application to Cantor's theory of aggregates, three hours. — By Mr. A. BERRY: Elliptic functions, Bessel functions and Fourier series, three hours. — By Mr. MONRO: Hydrodynamics and sound, three hours. — By Mr. J. H. GRACE: Invariants and geometric applications, three hours. — By Mr. E. T. WHITTAKER: The problem of three bodies, three hours.

Lent term, 1905. — By Professor A. R. FORSYTH: Differential geometry, three hours. — By Professor G. H. DARWIN: Dynamical astronomy (elementary), three hours. — By Professor Sir R. S. BALL: Theory of homographic transformation, three hours. — By Professor J. LARMOR: Electrodynamics with optical applications, three hours; Elementary mathematical physics, three hours. — By Professor J. J. THOMSON: Electricity and magnetism, three hours; Discharge

of electricity through gases, two hours. — By Professor B. HOP-
KINSON: Applied mathematics II, two hours; Electricity II,
two hours. — By Dr. E. W. HOBSON: Theory of aggregates
and theory of functions of a real variable II, three hours. —
By Dr. H. F. BAKER: Theory of functions, three hours;
Analysis, three hours. — By Mr. G. B. MATTHEWS: Galois
theory, three hours. — By Mr. H. W. RICHMOND: Geometry
of curves and surfaces, three hours. — By Mr. H. M. MAC-
DONALD: Aerial and other vibrations, three hours. — By Mr.
R. A. HERMAN: Hydrodynamics, two courses, each three
hours. — By Mr. A. N. WHITEHEAD: Principles of mathe-
matics, three hours. — By Mr. A. BERRY: Elliptic functions,
three hours. — By Mr. C. T. BENNETT: Line geometry, three
hours. — By Mr. J. H. GRACE: Invariants and geometric ap-
plications II, three hours. — By Mr. E. T. WHITTAKER:
Hansen's lunar theory and related planetary theories, three
hours. — By Mr. E. W. BARNES: Linear difference equations
of the first order, and certain functions derived from them, three
hours.

   Easter term, 1905. — By Professor A. R. FORSYTH: Dif-
ferential geometry II, three hours. — By Professor J. LAR-
MOR: Theory of gases and thermodynamics, three hours. — By
Professor J. J. THOMSON: Electricity and magnetism, three
hours. — By Dr. E. W. HOBSON: Ellipsoidal harmonics, three
hours. — By Dr. H. F. BAKER: Theory of functions, three
hours; Analysis, three hours. — By Mr. W. L. MOLLISON:
Theory of potential and electrostatics, three hours. — By Mr.
A. N. WHITEHEAD: Non-euclidean geometry, three hours. —
By Mr. A. BERRY: Transformation of elliptic functions, three
hours. — By Mr. HARDY: Integral functions, three hours.

   OXFORD UNIVERSITY. — *Michaelmas term*, 1904. — By Pro-
fessor E. B. ELLIOTT: Theory of numbers, two hours; In-
finite series and products, two hours. — By Professor W. ESSON:
Higher plane curves, three hours. — By Professor A. E. H.
LOVE: Harmonic analysis, three hours. — By Mr. J. E. CAMP-
BELL: Differential equations, two hours. — By Mr. J. W. RUS-
SELL: Differential calculus, two hours. — By Mr. C. H.
THOMPSON: Integral calculus, two hours. — By Mr. E. H.
HAYES: Analytical statics, three hours. — By Mr. C. H.
SAMPSON: Higher solid geometry, two hours. — By Mr. H.
T. GERRANS: Tridimensional rigid dynamics, two hours.

UNIVERSITY OF BRESLAU. — By Professor J. ROSANES: Analytic geometry of space, three hours; Seminar, one hour; Introduction to differential equations, three hours. — By Professor R. STURM: Theory of numbers, three hours; Polyhedra, three hours; History of mathematics, one hour; Seminar, one hour. — By Professor E. NEUMANN: Theoretical optics, four hours.

UNIVERSITY OF ERLANGEN. — By Professor P. GORDAN: Analytic geometry of the plane, four hours; Theory of invariants, four hours; Seminar, three hours. — By Professor M. NOETHER: Differential and integral calculus I, four hours; Analytic mechanics, three hours; Differential geometry, two hours; with exercises, one hour.

UNIVERSITY OF FREIBURG. — By Professor J. LÜROTH: Theory of functions of a complex variable, four hours; Popular astronomy, two hours; Seminar, one hour. — By Professor L. STICKELBERGER: Analytic geometry and differential calculus, five hours; with exercises, two hours; Political arithmetic, two hours. — By Professor A. LOEWY: Analytic geometry of space, four hours; Seminar, two hours. — By Professor K. SEITH: Introduction to algebraic analysis, two hours.

UNIVERSITY OF GIESSEN. — By Professor M. PASCH: Differential and integral calculus, four hours; Selected chapters in plane geometry, three hours; Seminar, one hour. — By Professor E. NETTO: Analytic mechanics, four hours; Elliptic functions, three hours; Seminar, one hour. By ————— (successor to Professor J. Wellstein): Descriptive geometry, six hours; Synthetic geometry, two hours.

UNIVERSITY OF GREIFSWALD. — Py Professor W. THOMÉ: Differential and integral calculus, four hours; Algebraic plane curves, two hours; Seminar, two hours. — By Professor F. ENGEL: Theory of functions, four hours; Theory of transformation groups, four hours; Differential geometry, one hour; Seminar, two hours. — By Professor G. KOWALEWSKI: Mechanics II, four hours; with exercises, one hour; Determinants, two hours; Differential invariants, one hour.

UNIVERSITY OF HALLE. — By Professor G. CANTOR: Analytic mechanics, five hours; Seminar, two hours. — By Professor A. WANGERIN: Synthetic geometry, four hours; Integral calculus with exercises, four hours; Calculus of

variations, two hours; Seminar, two hours. — By Professor
V. EBERHARD : Selected chapters in analytic geometry of the
plane, with exercises, two hours; Analytic geometry of space,
two hours. — By Professor H. GRASSMANN : Calculation with
vectors with application to the theory of surfaces, three hours;
Elements of descriptive geometry, two hours; with exercises,
one hour. — By Dr. C. BUCHHOLZ : Mechanical potential and
elements of higher geodesy, two hours. — By Dr. S. BERN-
STEIN : Partial differential equations I, hydrodynamics and
acoustics, four hours; with exercises, one hour.

UNIVERSITY OF HEIDELBERG. — By Professor L. KOENIGS-
BERGER : Higher algebra, four hours; Differential equations,
two hours; Calculus of variations, one hour; Theory of num-
bers, one hour; Seminar, two hours. — By Professor M. CAN-
TOR : Differential and integral calculus, four hours; with
exercises, one hour; Political arithmetic, two hours. — By Pro-
fessor K. KOEHLER : Synthetic geometry of space, three hours.
— By Dr. K. BOEHM : Elliptic functions, and introduction to the
general theory of functions, four hours; Plane and spherical
trigonometry, two hours.

UNIVERSITY OF JENA. — By Professor A. GUTZMER : In-
tegral calculus with exercises, five hours; Calculus of varia-
tions, four hours; Colloquium, two hours. — By Professor J.
THOMAE : Definite integrals, four hours; Differential geometry,
four hours; Seminar, two hours. — By Professor G. FREGE :
Analytic geometry of space, four hours; Fundamental concepts,
two hours. — By Professor R. RAU : Technical mechanics, four
hours.

UNIVERSITY OF KIEL. — By Professor L. POCHHAMMER :
Theory of numbers, three hours; Theory of functions, three
hours; with exercises, one hour. — By Professor P. STÄCKEL :
Integral calculus, three hours; Differential geometry, three
hours; with exercises, one and one half hours.

UNIVERSITY OF LEIPZIG. — By Professor C. NEUMANN :
Potential and spherical harmonics, four hours; Seminar, two
hours. — By Professor A. MAYER : Calculus of variations, five
hours; with exercises, one hour. — By Professor O. HÖLDER :
Mechanics, four hours; Theory of numbers, two hours; Sem-
inar, one hour. — By Professor F. HAUSDORFF : Differential
and integral calculus, four hours; with exercises, one hour.—

By Dr. H. LIEBMANN: Analytic geometry of space, two hours; Determinants, two hours. — By Professor K. ROHN (of Dresden): Projective geometry, two hours.

UNIVERSITY OF MARBURG. — By Professor K. HENSEL: Theory of elliptic functions, four hours; Algebraic solutions of equations, three hours; Non-euclidean geometry, one hour; Seminar, two hours. — By Dr. F. V. DALWIGK: Analytic geometry of space, four hours; Descriptive geometry with exercises, six hours. — By Dr. F. JUNG: General theory of curves and surfaces, four hours.

UNIVERSITY OF MÜNSTER. — By Professor W. KILLING: Analytic geometry II, three hours; with exercises, one hour; Elliptic functions, four hours; Seminar, one hour. — By Professor R. V. LILIENTHAL: Analytic mechanics II, four hours; Introduction to the theory of differential equations, four hours; Seminar, one hour. — By Dr. M. DEHN: Descriptive geometry, two hours; Differential and integral calculus, four hours, with exercises, one hour.

UNIVERSITY OF MUNICH. — By Professor G. BAUER: Seminar, two hours. — By Professor F. LINDEMANN: Analytic geometry of the plane, four hours; Ordinary and partial differential equations, four hours; Mathematical basis of insurance, two hours; Seminar, one and one half hours. — By Professor A. VOSS: Algebra, four hours; Applications of the calculus to the theory of surfaces, four hours; Seminar on differential equations, two hours. — By Professor A. PRINGSHEIM: Differential calculus, five hours; Theory of functions, four hours. — By Professor K. DOEHLEMANN: Descriptive geometry I, five hours; with exercises, three hours; Twisted curves of orders 3 and 4, three hours; The imaginary in geometry, one hour. — By Professor E. V. WEBER: Determinants and linear transformations, four hours; Encyclopedia of elementary geometry, three hours; Geometry of the straight line and sphere, two hours.

UNIVERSITY OF ROSTOCK. — By Professor O. STAUDE: Differential and integral calculus, four hours; Differential geometry, four hours; Seminar, two hours.

UNIVERSITY OF TÜBINGEN. — By Professor A. V. BRILL; Introduction to higher mathematics, four hours; Nonrigid systems and the mechanics of Hertz, three hours; Seminar, two

hours. — By Professor H. STAHL : Higher algebra, three hours ; Application to the theory of functions, three hours ; Seminar, two hours. — By Professor L. MAURER : Hydrodynamics, three hours ; Theory of potential, two hours. — By Dr. L. GANS : Partial differential equations of physics, two hours.

UNIVERSITY OF WÜRZBURG. — By Professor F. PRYM : Theory of functions of a complex variable, four hours ; Theory of numbers, two hours ; Seminar, two hours. — By Professor E. SELLING : Differential and integral calculus, four hours ; Planetary orbits, three hours. — By Professor G. ROST : Descriptive geometry, four hours ; Analytic mechanics I, four hours ; Algebra, four hours ; Seminar, four hours.

UNIVERSITY OF INNSBRUCK. — By Professor O. STOLZ : Double integrals and elements of the calculus of variations, three hours ; Theory of functions, three hours ; Seminar, one hour. — By Professor K. ZINDLER : Algebra and theory of determinants, three hours ; Differential equations, three hours ; Selected chapters from elementary geometry, one hour.

UNIVERSITY OF STOCKHOLM. — By Professor G. MITTAG-LEFFLER : Elements of the theory of analytic functions. — By Professor H. VON KOCH : Integration of differential equations ; Differential calculus. — By Professor V. BJERKNES : Electricity and magnetism. — By Professor I. FREDHOLM : Rational mechanics. — Each course is given three times a week.

THE philosophical faculty of Göttingen proposes for 1907 the following prize subject :

The entropy function introduced by Clausius in his work on thermodynamics has acquired a far-reaching and profound significance through the labors of Gibbs, Planck, Boltzmann, Lorentz and others. The faculty desires a connected exposition of the rôle which this function plays in the domains of physics and chemistry, and an investigation of the diverse mechanical and electrodynamic interpretations of the entropy. Contributions should be submitted under the usual conditions by August 31, 1906.

THE prize offered by the philosophical faculty of Breslau for 1903, for a contribution to the theory of quadric surfaces of revolution has been awarded to Mr. MÜTH of Breslau.

THE Belgian academy of sciences announces as its prize problem of 1905 :

To determine the properties of the cubic line complex, especially that expressed by an equation of the form $xyz = kx'y'z'$, wherein x, y, z, x', y', z' are linear expressions in line coördinates.

THE Lobachevsky prize for 1903 was awarded to Professor D. HILBERT for the second edition of his Foundations of Geometry. Honorable mention was made of the memoirs of Messrs. Barbarin, Lemoine, Pieri and Study. The prize will next be awarded November 4, 1906 and competing memoirs must be received by the Physico-mathematical society of Kazan not later than November 4, 1905.

A MEDALLION in memory of the late Sir GEORGE GABRIEL STOKES, which has been erected in the north aisle of the choir of Westminster Abbey, was unveiled July 7 by the Duke of Devonshire, chancellor of the University of Cambridge, and formally transferred to the authorities of the Abbey. Addresses were made by Sir William Huggins, Lord Rayleigh, and Lord Kelvin.

ACTIVE steps have been taken by Trinity College, Dublin, to prepare a suitable memorial for the late GEORGE SALMON.

PROFESSOR F. KLEIN, of Göttingen, has been elected honorary member, and Professor W. F. OSGOOD, of Harvard, has been elected a member of the American academy of sciences, at Boston.

PROFESSOR G. LANDSBERG, of Heidelberg, and Professor J. WELLSTEIN, of Giessen, have been appointed professors of mathematics at the University of Strassburg.

PROFESSOR C. RUNGE, of Hannover, has been appointed associate professor of mathematics at the University of Göttingen.

PROFESSOR C. CRANZ, of Stuttgart, has been appointed professor of mathematics in the military academy at Charlottenburg.

PROFESSOR G. CANTOR has recently celebrated the twenty-fifth anniversary of his professorship of mathematics at the University of Halle.

AT the University of Kiev, Russia, Dr. I. I. KOSSONOGOF and Dr. P. V. VORONETZ have been promoted to assistant professorships of mathematics.

PROFESSOR H. V. MANGOLDT, of the technical high school at Aachen, and Professor F. SCHILLING, of the University of Göttingen, have been appointed professors of mathematics at the new technical high school at Danzig; the former was also appointed rector.

DR. F. EXNER and Dr. J. VALENTIN have been appointed docents in mathematics at the University of Vienna.

PROFESSOR T. F. HOLGATE, of Northwestern University, has been made acting president of the university.

AT Columbia University Associate Professor C. J. KEYSER has been promoted to a full professorship of mathematics.

MR. J. N. JAMES has been appointed professor of mathematics in Epworth University, Oklahoma, O. T.

PROFESSOR R. E. MORITZ, of the University of Nebraska, has been appointed head of the department of mathematics in the University of Washington, succeeding Professor A. RANUM, who has been appointed instructor in mathematics at the University of Wisconsin.

AT Oberlin College Mr. W. D. CAIRNS has been promoted to an associate professorship in mathematics, and Mr. R. V. HILL has been appointed tutor in mathematics.

PROFESSOR T. F. NICHOLS, of Hamilton College, has been promoted to a full professorship of applied mathematics.

DR. G. H. HALLETT has been promoted to an assistant professorship of mathematics at the University of Pennsylvania.

MR. C. A. HOLDEN has been appointed assistant professor of mathematics at Dartmouth College.

MR. J. J. SKINNER has resigned his position as assistant professor of mathematics in the Massachusetts Institute of Technology.

AT the University of Michigan Dr. J. W. BRADSHAW and Dr. L. C. KARPINSKI have been appointed instructors in mathematics.

MR. C. H. SISAM has been appointed instructor in mathematics at the U. S. Naval Academy, Annapolis. Dr. CARL GUNDERSEN has been appointed instructor in mathematics in the Michigan Agricultural College. Miss M. E. SINCLAIR and

Mr. C. HAVEMEYER have been appointed instructors in mathematics at the University of Nebraska. Mr. H. F. HART and Mr. H. A. FREEMAN have been appointed instructors in mathematics in Brown University.

ON August 15 occurred the death of Professor F. G. RADEL-FINGER, of Columbian University, aged 31 years. He had been a member of the AMERICAN MATHEMATICAL SOCIETY since 1900.

ON May 10 occurred the death of Professor E. SARRAU, of the Ecole polytechnique of Paris. Professor W. WEISS of the German technical school at Prague died June 19, at the age of of 55 years. Professor F. EISENLOHR, of the University of Heidelberg, died on July 21, at the age of 73 years. Professor G. J. ALLMAN of Queen's College, Galway, died recently at the age of 80 years. Professor J. D. EVERETT, of Queen's College, Belfast, died August 9, aged 73 years. Professor C. S. SLONIMSKI, of Warsaw, died in June, at the age of 93 years. The Rev. G. PIRIE, professor of mathematics in the University of Aberdeen, died August 21, at the age of 61 years.

RECENT catalogues of second-hand mathematical works: Joseph Jolowicz, Posen, catalogue No. 149, mathematics and general science, 975 titles; Macmillan and Bowes, Cambridge, England, list No. 302, mathematical and physical works, about 1,700 titles.