monotonous and of the stereotyped character, such as the falling body, oscillation in a resisting medium; a greater variety of illustrations would doubtless make the book more attractive to the non-mathematical reader for whom it is chiefly intended.

It is an interesting fact that the need for books of this type is becoming more and more clearly recognized; it seems to be a part of the movement for the popularization of the principal results of the sciences; how far this can be carried in the case of mathematics seems doubtful, because mathematics is and must remain, as soon as we pass beyond the elementary stages, a highly theoretical subject, which does not lend itself to popularization. Quite a different thing it is of course to present some topic in mathematics in such a way as to make it available to those who have had at least some preparation; such as for instance giving undergraduate students an idea of what lies beyond or below, as has been done in J. W. A. Young's Monographs on Modern Mathematics and in J. W. Young's Fundamental Concepts of Algebra and Geometry; or again, to give to students of physics and chemistry a knowledge of those parts of mathematics that are essential to a full understanding of their own subjects. It is as a contribution to those fields that Professor Love's book is perhaps most valuable, taking its place by the side of such books as Nernst und Schoenflies's Mathematische Behandlung der Natur-wissenschaften.

<div align="right">ARNOLD DRESDEN.</div>

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## NOTES.

THE March number (volume 14, number 3) of the *Annals of Mathematics* contains the following papers: "Groups which contain an abelian subgroup of prime index," by G. A. MILLER; "On infinite systems of linear integral equations," by L. BRAND; "The method of monodromie with applications to three-parameter quartic equations," by R. P. BAKER; "Note on the existence theorem of a minimum of $\int_{xy}^{x'y'} P dx + Q dy$," by E. SWIFT; "Continuant expressions for $\sqrt{a^2 + b^2}$ and $(\sqrt{a^2 + b^2} + a)^n$," by L. H. RICE.

AT the meeting of the London mathematical society held on February 13 the following papers were read: By T. C. LEWIS, "Figures in $n$-dimensional space analogous to orthocentric tetrahedra"; by J. E. LITTLEWOOD, "A property of the zeta function"; by G. H. HARDY, "The summability of Fourier's series"; by G. H. HARDY and J. E. LITTLEWOOD, "Trigonometric series which converge nowhere or almost nowhere"; by H. BOHR, "A theorem concerning power series"; by P. J. HEAWOOD, "The theorem of quadratic reciprocity"; by J. B. HOLT, "The irreducibility of Legendre's polynomials"; by W. H. YOUNG, "The mode of oscillation of a Fourier series and its allied series"; by H. T. H. PIAGGIO, "Some nonprimary perpetuant syzygies of the second kind."

THE opening number of *Die Naturwissenschaften*, a weekly scientific journal edited by Dr. A. BERLINER and Dr. C. THESING in Berlin, appeared January 3, 1913. It proposes to furnish a general report of progress in pure and applied science, including mathematics and technical sciences. The present number contains an outline of the German report to the International commission on the teaching of mathematics by Professor A. GUTZMER, and a number of other papers on mathematical subjects are to follow. The subscription price is 24 marks per year.

UNIVERSITY OF CHICAGO. The following advanced courses in mathematics are announced for the summer quarter. All courses are four hours a week. By Professor E. H. MOORE: Fourier series, first term; Lemmas on the theory of point sets, first term.—By Professor O. BOLZA: Linear integral equations; Theory of functions.—By Professor F. R. MOULTON: Modern theories of analytic differential equations.—By Professor J. W. A. YOUNG: Critical review of secondary mathematics for teachers.—By Professor E. J. WILCZYNSKI: Theory of equations.—By Professor W. D. MACMILLAN: Observational astronomy; Celestial mechanics.—By Professor H. E. SLAUGHT: Differential equations.—By Professor A. C. LUNN: Graphical analysis; statistical mechanics.—By Professor G. A. BLISS: Projective geometry.

UNIVERSITY OF PENNSYLVANIA. The following courses are announced for the academic year 1913–1914: By Pro-

fessor E. S. CRAWLEY: Higher plane curves, three hours.—
By Professor G. E. FISHER: Differential equations, three
hours; Theory of functions of a complex variable, three
hours.—By Professor I. J. SCHWATT: Definite integrals,
three hours.—By Professor G. H. HALLETT: Theory of
abstract groups, three hours; Introduction to higher algebra,
three hours.—By Professor F. H. SAFFORD: Mathematical
theory of elasticity, three hours; Partial differential equations,
three hours.—By Professor M. J. BABB: History of mathe-
matics, two hours; Theory of statistics, two hours.—By
Professor G. G. CHAMBERS: Synthetic projective geometry
(second course), three hours.—By Professor O. E. GLENN:
Theory of invariants, three hours.—By Dr. H. H. MITCHELL:
Theory of numbers, three hours.—By Dr. R. L. MOORE:
Theory of point sets, with applications, three hours.—By
Dr. F. W. BEAL: Differential geometry, three hours.

THE following courses in mathematics are announced for
the summer semester, 1913.

UNIVERSITY OF BONN.—By Professor E. STUDY: Differential
geometry, I, two hours; Higher geometry, I, two hours;
Seminar, two hours.—By Professor F. LONDON: Introduction
to the theory of differential equations, three hours; Axono-
metry and perspective, three hours.—By Professor F.
HAUSDORFF: Elements of differential and integral calculus,
with exercise, five hours.—By DR. J. O. MÜLLER: Algebraic
equations, three hours; Introduction to geodesy, two hours;
Proseminar, two hours.

UNIVERSITY OF GÖTTINGEN.—By Professor H. HILBERT:
Elements and principles of mathematics, four hours; Theory
of motion of electrons, two hours; Seminar, two hours.—By
Professor C. RUNGE: Differential and integral calculus, I, six
hours; Seminar, two hours.—By Professor F. BERNSTEIN:
Theory of probabilities and applications, four hours; Mathe-
matics of insurance, two hours; Seminar, two hours.—By Pro-
fessor O. TOEPLITZ: Differential equations, four hours.—By
Dr. H. WEYL: Algebra, four hours; Survey of the theory of
elliptic, abelian, and automorphic functions, two hours.—
By Dr. L. v. SENDEN: Descriptive geometry, four hours;
Graphical methods of applied mathematics, six hours.—By
Dr. HECKE: Definite integrals, with applications, three hours;

Theory of algebraic fields, four hours.—By Dr. R. COURANT:
Calculus of variations, three hours; Exercises in analytic
geometry of space, two hours.—By Professor L. PRANDTL:
Mechanics of continua, three hours; Seminar in aeronautics,
two hours.

UNIVERSITY OF MUNICH.—By Professor F. LINDEMANN:
Analytic geometry of space, five hours; Theory of definite
integrals and of Fourier series, four hours; Mechanics of de-
formable bodies, two hours; Seminar, two hours.—By Pro-
fessor A. VOSS: Integral calculus, four hours; Introduction to
the theory of algebraic curves and surfaces, three hours.—By
Professor A. PRINGSHEIM: Algebra, II, four hours; Selected
chapters in the theory of functions, four hours.—By Professor
G. HARTOGS: Descriptive geometry, with exercises, seven
hours.—By Professor BRUNN: Analysis situs, three hours.—
By Dr. ROSENTHAL: Algebraic analysis, four hours; Theory of
sets of points, three hours.—By Dr. DINGLER: Elements of
differential geometry of plane curves, three hours.—By Dr.
BOEHM: Advanced integral calculus, and boundary problems,
three hours; Exercises in mathematics of insurance, two hours;
Mathematical statistics, two hours.

DURING the last thirty-six years Harvard University has
sent students of mathematics to Europe on travelling fellow-
ships in almost unbroken succession. In only two of these
years has there been no student of mathematics or mathe-
matical physics studying abroad on such a fellowship, while
several times there have been two or three such appointments
simultaneously. These opportunities for foreign study were
about doubled three years ago by the Sheldon bequest of
$350,000, the income of which is used in grants for this purpose
(not necessarily in mathematics), so that it may be expected
that in future, as during the past four years, there will ordi-
narily be at least two travelling fellows from Harvard in
mathematics each year with stipends varying from $500 to
$1150. The first Sheldon Fellow in mathematics was Dr.
G. C. EVANS who held the appointment for two years while
studying in Rome. This year Mr. W. C. GRAUSTEIN is
Sheldon Fellow at Bonn, while Mr. E. S. ALLEN in Rome and
Dr. TOMLINSON FORT in Göttingen also hold travelling fellow-
ships from Harvard for the study of mathematics. The ap-

pointments are invariably given to men who have distinguished themselves by their work as resident students at Harvard, though frequently to students whose bachelor's degree was taken elsewhere.

THE Lobachevsky prize of the academy of sciences of Kasan has been awarded to Professor F. SCHUR, of the University of Strassburg, for his researches in the foundations of geometry.

As a memorial to Professor P. G. TAIT, it is proposed to establish a second chair of natural philosophy in the University of Edinburgh. A committee has been organized to raise a fund of £20,000 to £25,000 for this purpose. Subscriptions should be sent to the honorary treasurer, Sir G. M. Paul, 16 St. Andrew Square, Edinburgh.

MR. R. H. MOODY has been appointed professor of mathematics at Muir's Central College, Allahabad.

PROFESSOR FELIX KLEIN, of the University of Göttingen, has been relieved permanently of his university duties, on account of ill health.

DR. P. BERNAYS has been appointed docent in mathematics at the University of Zürich.

DR. A. HOBORSKI has been appointed docent in mathematics at the University of Cracow.

PROFESSOR H. ANDOYER has been appointed professor of mathematical astronomy at the University of Paris.

PROFESSOR C. CARATHÉODORY, of the technical school at Breslau, has accepted a professorship of mathematics at the University of Göttingen.

PROFESSORS M. DISTELI and K. HEUN, of the technical school at Carlsruhe, have received the title of Hofrat.

PROFESSOR E. STUDY, of the University of Bonn, has received the title of privy councillor.

DR. M. STUYVAERT has been appointed docent in algebraic analysis at the University of Ghent.

DR. H. MOHRMANN, of the technical school at Carlsruhe, has accepted the professorship of mathematics at the mining academy of Clausthal.

DR. N. E. NÖRLUND has been appointed professor of mathematics at the University of Lund.

DR. L. A. H. WARREN has been appointed professor of mathematics at the University of Manitoba.

PROFESSOR MAXIME BÔCHER, of Harvard University, has been appointed exchange professor to lecture at the Sorbonne during the first half of the academic year 1913–1914.

PROFESSOR O. P. AKERS, of Allegheny College, has been granted leave of absence for the academic year 1913–1914, to travel and study in Europe.

DR. J. E. MANCHESTER, of the University of Minnesota, died January 24, at the age of 57 years.

BOOK catalogues: R. Friedlander, Karlstrasse 11, Berlin, catalogue 481–482, 94 and 14 pages.—A. Hermann, 6 Rue de la Sorbonne, Paris, mathematics, physics, and natural science, 98 pages.—A. Reichmann, Hauptstrasse 18, Vienna, catalogue 79, 1653 titles.

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## NEW PUBLICATIONS.

### I. HIGHER MATHEMATICS.

BAIRE (R.). Théorie des nombres irrationnels, des limites et de la continuité. 2e édition. Paris, Vuibert, 1912. 8vo. 64 pp.

BERNSTEIN (S.). On the best approximation to continuous functions by means of polynomials of given degree. (Russian.) Charkow, 1912. 8vo. 153 pp. $0.75

BEST (L.). Elementarer Beweis des Fermatschen Satzes. Darmstadt, Schlapp, 1912. 8vo. 4 pp. M. 0.50

BIDDLE (A. D.). Constructive theory of the unicursal plane quartic by synthetic methods. (Publications of the University of California.) Berkeley, 1912. 8vo. 28 pp. $0.60