

This ether is subject to condensations and rarefactions, which are propagated in all directions. The character of the wave thus produced seems not to enter his calculations.

Matter is continuous. In fact the electron is not anywhere mentioned in the theory he advances. It is endowed with energy in the form of heat and chemical energy. The radioactive disintegration is merely the chipping at the surface of the atom due to the motion of the internal energy. Energy is then defined to be the internal action of the atom, all energy being *densitic* in character, which means it consists of condensation or rarefaction waves. The wave frequency differentiates the various forms of energy. Gravity on this scheme is of a single frequency.

Magnetism is energy generated in the centers of the iron atoms, being "the natural energy of the iron, modified by the substance with which the iron is combined in molecules, and augmented through a certain method of reciprocal energization." The remaining definitions may be passed over. The author seems to be familiar with a number of antiquated textbooks of a college grade, and somewhat with modern phenomena. From these he has attempted to build up an explanation of the very intricate laws and phenomena of the whole of physics. The result is what would have been expected.

JAMES BYRNIE SHAW.

---

#### NOTES.

THE April number (volume 20, number 2) of the *Transactions of the American Mathematical Society* contains the following papers: "Memoir on the general theory of surfaces and rectilinear congruences," by G. M. GREEN; "Modular concomitant scales, with a fundamental system of formal covariants, modulo 3, of the binary quadratic," by O. E. GLENN; "Concerning a set of postulates for plane analysis situs," by R. L. MOORE; "On the limit functions of sequences of continuous functions converging relatively uniformly," by E. W. CHITTENDEN.

AT the meeting of the National Academy of Sciences held at Washington April 28-30, Professors OSWALD VEBLEN, E. J.

WILCZYNSKI, and E. B. WILSON were elected members. Professor EDWARD KASNER read a paper on "Geometry of the wave equation."

At the meeting of the Edinburgh mathematical society on May 9, the following papers were read: By W. H. METZLER, "Theorems concerning the differentiation of a circulant;" by T. M. MACROBERT, "The integrals of the hypergeometric equation."

THE Indian mathematical society held its second conference at Bombay, January 11-13, in connection with the session of the Indian science congress. Professor A. C. L. WILKINSON, of Elphinstone College, Bombay, is president. The society has a membership of 195.

THE following university courses in mathematics are announced:

COLUMBIA UNIVERSITY (academic year 1919-1920).—By Professor T. S. FISKE: Differential equations, four hours.—By Professor F. N. COLE: Invariants and higher plane curves, three hours (second term); Theory of groups, three hours.—By Professor JAMES MACLAY: Theory of functions, four hours (first term).—By Professor D. E. SMITH: History of mathematics, two hours; Practicum in the history of mathematics, four hours.—By Professor C. J. KEYSER: Modern theories in geometry, four hours.—By Professor EDWARD KASNER: Seminar in differential geometry, two hours.—By Professor W. B. FITE: Differential equations, three hours.—By Dr. J. F. RITT: Transcendental functions, three hours (second term).

CORNELL UNIVERSITY (academic year 1919-1920).—By Professor JAMES McMAHON: Mathematics of insurance and probabilities; Actuarial science.—By Professor J. H. TANNER: Mathematics of finance.—By Professor VIRGIL SNYDER: Birationals transformations; Theory of equations (second term).—By Professor F. R. SHARPE: Fourier series and the potential function.—By Professor ARTHUR RANUM: Non-euclidean geometry (first term); Theory of numbers (second term).—By Professor W. B. CARVER: Projective geometry.—By Professor D. C. GILLESPIE: Elementary differential equations;

Calculus of variations.—By Professor W. A. HURWITZ: Theory of groups; Vector analysis.—By Professor C. F. CRAIG: Theory of differential equations; Mathematics for teachers.—By Professor F. W. OWENS: Advanced calculus; Mechanics.—By Dr. H. B. OWENS: Advanced analytic geometry.

All courses are three hours a week.

HARVARD UNIVERSITY (academic year 1919–1920).—All courses meet three times a week throughout the year, except those marked \*, which meet for half a year.—By Professor W. F. OSGOOD: Differential and integral calculus (advanced course); Infinite series and products;\* Galois's theory of equations.\*—By Professor C. L. BOUTON: The elementary theory of differential equations;\* Differential equations, with an introduction to Lie's theory of continuous groups.—By Professor J. L. COOLIDGE: Introduction to modern geometry and modern algebra; Projective geometry;\* Non-euclidean geometry.\*—By Professor E. V. HUNTINGTON: The fundamental concepts of mathematics.\*—By Professor O. D. KELLOGG (of the University of Missouri): Introduction to the theory of potential functions and Laplace's equation;\* Vector analysis.\*—By Professor G. D. BIRKHOFF: Differential and integral calculus (advanced course);\* The analytical theory of heat and problems in elastic vibrations;\* The partial differential equations of mathematical physics.—By Professor ———: The theory of functions (introductory course); Developments in series;\* Dynamics (second course);\* By Professor W. C. GRAUSTEIN: Differential geometry of curves and surfaces.—By Dr. H. C. M. MORSE: Elliptic functions;\* Auto-morphic functions.\*—By Dr. I. A. BARNETT: Integral equations;\* Functions of lines.\*

Professor KELLOGG will conduct a fortnightly seminar in analysis. Courses of research are also offered by Professor OSGOOD in the theory of functions, by Professor BOUTON in the theory of point transformations, by Professor COOLIDGE in geometry, by Professor KELLOGG in analysis, by Professor BIRKHOFF in the theory of differential equations, and by Professor GRAUSTEIN in geometry.

PRINCETON UNIVERSITY (academic year 1919–1920).—By Professor H. B. FINE: Functions of a complex variable.—By Professor L. P. EISENHART: Differential geometry.—By

Professor OSWALD VEBLEN: Seminar in analysis situs.—By Professor PIERRE BOUTROUX: Linear differential equations.—By Professor J. H. M. WEDDERBURN: Higher algebra.

All courses are three hours a week.

UNIVERSITY OF CHICAGO. Autumn quarter:—By Professor E. H. MOORE: Seminar in general analysis, I, two hours; Matrices in general analysis, four hours.—By Professor G. A. BLISS: Theory of functions of a real variable, four hours; Calculus, I, five hours.—By Professor L. E. DICKSON: Continuous groups, four hours; Elementary theory of equations, four hours.—By Professor H. E. SLAUGHT: Differential equations, four hours.—By Professor A. C. LUNN: Vector analysis, four hours; Applied mathematics, five hours. Winter quarter:—By Professor E. H. MOORE: Seminar in general analysis, II, two hours; Theory of functions of infinitely many variables in general analysis, four hours.—By Professor G. A. BLISS: Calculus of variations, five hours; Calculus, II, five hours.—By Professor L. E. DICKSON: Theory of algebraic invariants, four hours; Solid analytics, four hours.—By Professor H. E. SLAUGHT: Theory of definite integrals, four hours.—By Professor E. J. WILCZYNSKI: Projective geometry, I, four hours.—By Professor A. C. LUNN: Applications of vector analysis in the theory of electromagnetism, four hours; Applied mathematics, II, five hours.—By Professor J. W. A. YOUNG: Calculus, I, five hours. Spring quarter:—By Professor E. H. MOORE: Seminar in general analysis, III, two hours; Theory of functions of infinitely many variables in general analysis, II, four hours.—By Professor G. A. BLISS: Functions of lines, four hours; Calculus, III, five hours.—By Professor L. E. DICKSON: Finite groups, four hours.—By Professor E. J. WILCZYNSKI: Higher geometry, four hours; Projective geometry, II, four hours.—By Professor A. C. LUNN: The theory of relativity, four hours; Applied mathematics, III, five hours.—By Professor J. W. A. YOUNG; Limits and series, four hours; Calculus, II, five hours.

UNIVERSITY OF ILLINOIS (academic year 1919–1920).—By Professor E. J. TOWNSEND: Differential equations and advanced calculus; Functions of real variables.—By Professor G. A. MILLER: Theory of equations (first term); Theory of groups, II.—By Professor J. B. SHAW: Fundamental functions

(first term); Functional transformations (second term).—By Professor A. B. COBLE: Automorphic functions; Solid analytic geometry (second term).—By Professor R. D. CARMICHAEL: Linear difference equations.—By Professor ARNOLD EMCH: Algebraic surfaces.—By Professor A. R. CRATHORNE: Actuarial theory.—By Professor A. J. KEMPNER: Modern algebra.—By Dr. E. B. LYTLE: History of mathematics, two hours (second term).—By Dr. HENRY BLUMBERG: Projective geometry. All courses are three hours a week unless otherwise designated.

UNIVERSITY OF PENNSYLVANIA (summer session, July 8 to August 16).—By Professor G. H. HALLETT: Higher calculus, five hours.—By Professor H. H. MITCHELL: Mathematical theory of probability, five hours.—By Professor R. L. MOORE: Introduction to the theory of functions of a complex variable, five hours.

YALE UNIVERSITY (academic year 1919–1920).—By Professor JAMES PIERPONT: Elliptic functions.—By Professor P. F. SMITH: Foundations of geometry.—By Professor E. W. BROWN: Hydrodynamics with applications to aeronautics.—By Professor W. R. LONGLEY: Theory of differential equations.—By Professor J. I. TRACEY: Modern geometry, including differential geometry (a first course).—By Mr. J. K. WHITTEMORE: Differential geometry.—By Dr. J. R. KLINE: Advanced algebra. All courses are two hours a week.

THE announcement in the May BULLETIN of the death of Professor H. G. ZEUTHEN was an error which the responsible editor is more than glad to correct. Professor Zeuthen celebrated on February 15 his eightieth birthday. The BULLETIN wishes this Nestor of Danish mathematicians many happy returns.

AT Harvard University, assistant professor G. D. BIRKHOFF has been promoted to a full professorship of mathematics. Assistant professor W. C. GRAUSTEIN, of Rice Institute, has been appointed assistant professor, and Mr. B. H. BROWN and Mr. C. A. RUPP, JR., have been appointed instructors. Professor O. D. KELLOGG, on leave of absence from the University of Missouri, has been appointed lecturer for the academic year 1919–1920.

IN the department of mathematics of the Naval academy at Annapolis, the following promotions have been announced: to be professor, Mr. PAUL CAPRON; to be associate professors, Mr. W. J. KING and Mr. J. B. EPPES; to be assistant professors, Mr. J. A. BULLARD, Mr. JOHN TYLER, Mr. ARTHUR KIERNAN, Mr. J. N. GALLOWAY, Mr. ALEXANDER DILLINGHAM, and Dr. G. R. CLEMENTS. Dr. G. H. CRESSE, of the University of Michigan, has been appointed instructor.

AT the University of Minnesota, Professor G. N. BAUER remains on leave of absence until January 1, 1920. Assistant professor DUNHAM JACKSON, of Harvard University, has been appointed professor of mathematics, and Major W. L. HART has been appointed assistant professor. Mr. R. W. BRINK has been promoted from an instructorship to an assistant professorship, and granted leave of absence for the academic year 1919-1920, during which time he will be lecturer at the University of Edinburgh. Miss MINNA J. SCHICK has been appointed instructor in mathematics.

DR. C. E. WILDER has been appointed assistant professor of mathematics at Northwestern University.

MR. P. A. FRALEIGH, of Cornell University, has been appointed instructor in mathematics at Dartmouth College.

---

## NEW PUBLICATIONS.

### I. HIGHER MATHEMATICS.

- ANDERSEN (A. F.), BOHR (H.) og MOLLERUP (J.). *Nyere Undersøgelser over Integralregningen*. Kjøbenhavn, 1917. 63 pp.
- BOHR (H.). See ANDERSEN (A. F.).
- BOREL (E.). *Die Elemente der Mathematik*. Vom Verfasser genehmigte deutsche Ausgabe von P. Stäckel. Band I: Arithmetik und Algebra nebst den Elementen der Differential-Rechnung. 2te Auflage. Leipzig, Teubner, 1919. 8vo. 16 + 404 pp. M. 12.00
- CASTELNUOVO (G.). *Calcolo delle probabilità*. Milano, Albrighi, Segati e compagnia, 1919. 23 + 373 pp. L. 20.00
- HALPHEN (G. H.). *Œuvres publiées par les soins de C. Jordan, H. Poincaré, E. Picard, avec la collaboration de E. Vessiot*. Tome 2. Paris, Gauthier-Villars, 1918. 7 + 560 pp. Fr. 40.00
- HJELMSLEV (J.). *Lærebog i Gemoetri*. Til Brug ved den Polytekniske Læreanstalt. 1ste Afsnit. Kjøbenhavn, Gjellerup, 1917. 8vo. 208 pp.