is but the culmination of a long series of changes which have been taking place both within and without the nucleus. All of these changes are ascribed by Professor Hartog to the operation of other physical and vital forces which are finally succeeded by the "new force" which comes into operation upon the establishment of the spindle-shaped figure. The efforts of many who would explain the process of mitosis through the action of various chemical and physical laws have failed through inadequacy of the explanations to meet all the conditions of the process. It does not seem that the author has been more successful by first proclaiming an absolute divorce between nuclear division and cell division and then invoking a new force to complete the broken contract.

For those who enjoy philosophical debate and formal explanations there will be much of interest in Professor Hartog's discussion of vitalism and of heredity through the operation of universal and unconscious memory. Very readable is his appreciation of the work of Samuel Butler. The teacher will find sound argument for natural as opposed to strictly logical methods of teaching in the chapter on "Interpolation in Memory." In the final chapter on "The Teaching of Nature Study" there is much sound pedagogical wisdom and moral support for those who would have such work taught in a way to make it worth the while of the student.

C. E. McClung

Modern Research in Organic Chemistry. By F. G. Pope, B.Sc. (Lond.), F.C.S., Lecturer on Organic Chemistry, East London College. New York, D. Van Nostrand Company. 1913. $5\frac{1}{2} \times 7\frac{1}{2}$, Cloth. Pp. xi + 324. With 261 diagrams. Price $2.25 net.

This book is an attempt to bring before the student of chemistry a brief account of the development of some of the more important chapters of organic chemistry. It is the American reprint of the English book with the same title published by Methuen and Co. in London in 1912. It contains an introduction by Professor J. T. Hewitt and nine chapters which have no connection with each other. These chapters are: I., The Polymethylenes; II., The Terpenes and Camphors; III., The Uric Acid or Purine Group; IV., The Alkaloids; V., The Relation between the Color and Constitution of Chemical Compounds; VI., Salt Formation, Pseudo-acids and Bases; VII., The Pyrones; VIII., Ketenes, Ozonides, Triphenylmethyl; IX., The Grignard Reaction.

In each chapter methods of preparation, for the most part synthetical, are given and the reactions of some of the best known representatives of the different classes of compounds are discussed, especially those which are used to determine the structural formulas of the compounds. Throughout the book structural formulas are used almost exclusively. At the end of each chapter there is a bibliography containing a list of the more important papers on the subject matter of the text, so that the student may consult the original articles if he desires to do so. The book is very difficult reading, but for those to whom the original papers are not available and who wish a brief résumé of the researches on which the structure of these compounds is based, it will probably prove useful.

In a book with such a title we should naturally expect something to be said of the researches on the carbohydrates, on the synthesis of indigo and of india-rubber, but no mention is made of these very important chapters of organic chemistry.

W. R. Orndorff

SCIENTIFIC JOURNALS AND ARTICLES

The October number (Vol. 14, No. 4) of the *Transactions of the American Mathematical Society* contains the following papers:

Maxime Bôcher: "Applications and generalizations of the conception of adjoint systems."

E. J. Wilczynski: "On a certain class of self-projective surfaces."

G. A. Miller: "On the representation groups of given abstract groups."

Dunham Jackson: "On the accuracy of trigonometric interpolation."

G. D. Birkhoff: "On a simple type of irregular singular point."

John McDonnell: "On quadratic residues."

H. M. Sheffer: "A set of five independent postulates for Boolean algebras, with application to logical constants."

Mildred Sanderson: "Formal modular invariants with application to binary modular covariants."

THE opening (October) number of Vol. 20 of the *Bulletin of the American Mathematical Society* contains: "Note on the gamma function," by G. D. Birkhoff; "Some properties of space curves minimizing a definite integral with discontinuous integrand," by E. J. Miles; "The degree of a cartesian multiplier," by D. R. Curtiss; "On closed continuous curves," by Arnold Emch; "Let us have our calculus early" (review of Mercer's "Calculus for Beginners"), by E. B. Wilson; "Shorter Notice": Ziwet and Field's "Introduction to Analytical Mechanics," by Kurt Laves; "Notes"; and "New Publications."

THE November number of the *Bulletin* contains: Report of the twentieth summer meeting of the society, by H. E. Slaught; "Intuitionism and formalism," by L. E. J. Brouwer; "Shorter Notices": Arnoux's "Essai de Géométrie analytique modulaire à deux Dimensions," by L. E. Dickson; Padoa's "La Logique déductive dans sa dernière Phase de Développement," by J. B. Shaw; Hun and MacInnes's "Elements of Plane and Spherical Trigonometry," by Cora B. Hennel; "Notes"; and "New Publications."

THE articles in *The American Journal of Science* for November are as follows:

"Upper Devonian Delta of the Appalachian Geosyncline," by J. Barrell.

"Optical Bench for Elementary Work," by H. W. Farwell.

"Volcanic Research at Kilauea in the Summer of 1911," by F. A. Perret; with Report by A. Brun.

"Observations on the Stem Structure of *Psaronius Brasiliensis*," by O. A. Derby.

"Fauna of the Florissant (Colorado) Shales," by T. D. A. Cockerell.

"The Photoelectric Effect," by L. Page.

"Graphical Methods in Microscopical Petrography," by F. E. Wright. (With Plates II. to IX.)

"A Graphical Plot for Use in the Microscopical Determination of the Plagioclase Feldspars," by F. E. Wright.

"On the Influence of Alcohol and of Cane Sugar upon the Rate of Solution of Cadmium in Dissolved Iodine," by R. G. Van Name and D. U. Hill.

"Comparative Studies of Magnetic Phenomena. IV. Twist in Steel and Nickel Rods due to a Longitudinal Magnetic Field," by S. R. Williams.

A NOTE ON PENFOLD'S MODIFICATION OF BACILLUS COLI COMMUNIS[1]

PENFOLD'S[2] observation, that the cultivation of *Bacillus coli communis* upon monochloracetic acid media permits the selection of strains whose power to produce gas from certain sugars is permanently lost, has an important bearing not only upon mutation, but upon the mechanism of the carbohydrate metabolism of coliform organisms.

Through the work of Scruel,[3] Frankland and Frew,[4] Pakes and Jollyman,[5] Harden[6] and others, there has been gathered considerable evidence that the hydrogen and carbon dioxide, liberated in the fermentation of various sugars and allied compounds by coliform organisms, are the products of the decomposition of formic acid in accordance with the equation:

$$H_2CO_2 = H_2 + CO_2.$$

This decomposition has been attributed to the activity of a specific enzyme for which

[1] From the U. S. Department of Agriculture, Bureau of Animal Industry, Dairy Division.

[2] Penfold, W. J., *Proceedings of the Royal Society of Medicine*, Pathological Section, Vol. 4, Part 3, p. 97, 1910–11; *Journal of Hygiene*, Vol. II., p. 487, 1911.

[3] Scruel, *Arch. med. Belges*, ser. 3, t. 42, p. 362, 1892; ser. 4, t. 1, pp. 9 and 83, 1893.

[4] Frankland, Percy F., and Frew, William, *Journal of Chemical Society Transactions*, Vol. 61, p. 254, 1892, London.

[5] Pakes, Walter Charles Cross, and Jollyman, Walter Henry, *Journal of Chemical Society Transactions*, Vol. 79, Part 1, p. 386, 1901, London.

[6] Harden, Arthur, *Journal Chemical Society Transactions*, Vol. 79, Part 1, p. 610, 1901, London.