There is considerable scientific interest in the present (8th) annual report, issued under the editorship of the able director, Prof. Wm. Saunders, who is acknowledged as ideally fitted for his position.

We can only refer to a few of the most interesting results reported:

Prof. Jas. W. Robertson, the agriculturist, gives an outline of comparative tests of pure cultures of bacteria in the ripening of cream, from which he deduces results of a most interesting nature, showing the practical application of science in butter making. It was found that the flavor of butter is largely determined by the bacteria which develop in milk and cream, and that the conditions favoring the most satisfactory development of such bacteria prevail in a perfectly clean, well ventilated dairy; the bacteria present in the atmosphere under such conditions being superior to any artificial cultures tested.

The Chemist, Prof. Frank T. Shutt, contributes a notable article on the chemistry of the apple, completing the record of an investigation begun in previous years. It appears from the tables accompanying this discussion that 1,000 pounds of the leaves of the apple contain, as an average of the results of analyses of four varieties, 7.42 pounds nitrogen, 2.45 pounds phosphoric acid and 2.52 pounds of potash, most of which is of course returned to the soil. Estimating the average crop of the four varieties analyzed at 160 barrels per acre, there is removed from each acre in every crop of fruit the following quantities of important fertilizing constituents: 8.952 pounds nitrogen, 5.228 pounds phosphoric acid, 32.808 pounds potash. The chemist then advises the turning under of a leguminous crop, wood ashes and barnyard manure as a means of restoring to the soil the elements removed in the fruit crop.

There is no unnecessary use of technical terms in this admirable paper, and the deductions are drawn so directly from laboratory results that the veriest tyro cannot fail to be impressed with the close relation of this science to agriculture. The chemistry of the strawberry plant and of copper-salt fungicides is also discussed.

The reports of the horticulturist, the entomologist and the poultry manager are of the same high order of practically applied science.

B. E. FERNOW.

Les Nouvelles Théories Chimiques. Par A. ÉTARD, Paris, G. Masson, et Gauthiers-Villars et fils. 12 mo., pp. 196.

This volume is one of a series, Encyclopédie Scientifique des Aide-Memoire, published under direction of M. Léauté, Membre de l' Institut.

The author aims to present, in brief outline, the principal chemical theories of the day. His book is divided into two parts. Part I. consists of three sections, containing in all six chapters. These are devoted to: Definitions and general principles; a discussion of the atomic and kinetic hypotheses; a consideration of the chemical properties of molecules dependent upon the three states of aggregation of matter—the solid, the liquid, the gaseous.

Part II. contains four chapters. The first of these refers to the relation between mechanics and chemistry; the others treat respectively of thermo-, photo- and electro-chemistry.

Concerning the nature of matter the author refers to the views held by some 'Dynamistes purs,' that matter has no actual existence, but that that which we term matter is rather a sort of illusion of our senses impressed by a group of factors depending on energy, space and time.

Matter, he says, can not be precisely defined; it is everything which has weight, which can be seen or felt. Chemistry is described as the science of the transformations experienced by matter.

It will be of interest to many to learn (p. 46) that A. E. Béguyer de Chancourtois in his Vis tellurique, classement des corps simples ou radicaux obtenu au moyen d'un système de classification hélicoïdal et numerique, Paris, 1863, is credited with being the first to have published a continuous classification of the elements arranged according to their atomic weights. It will be recalled that Newlands' first communication 'On Relations Among the Equivalents,' appeared in the Chemical News, February 7th, of the year mentioned.

Attention is also called to the various shortcomings of the Periodic Law, and the surmise is hazarded that perhaps some day this system

of classifying the elements may be abandoned and recourse again had to Dumas' system of grouping the elements in natural families—of course, with modifications suggested by recent advances in chemistry.

In discussing the ion theory of Arrhenius, the author declares the idea of ion movements in fluids to be but a form of the kinetic hypothesis, advanced by Bernouilli about the middle of the last century; the ion playing the part of the gaseous molecule.

The attempt to cover so wide a range in so narrow a compass as Étard has chosen has, of course, necessitated an exceedingly terse mode of treatment. Although exception may be taken to some minor points, the author is evidently thoroughly abreast of the times, and has certainly succeeded in presenting the essential features of the numerous and varied themes he considers clearly and concisely.

Ferdinand G. Weichmann.

SCIENTIFIC JOURNALS.

AMERICAN CHEMICAL JOURNAL, JANUARY.

On the constitution of Phenoquinone: By C. Loring Jackson and Geo. Oenslager. As a result of their work on the hemiacetals, compounds of the phenoquinone group, the authors suggest structural formulæ for phenoquinone and quinhydrone. They have determined the structure of the hemiacetals and base the present hypothesis on the great similarity between these substances and phenoquinone, the former being formed (theoretically) by the addition of two molecules of alcohol to quinone, and the latter by the addition of two molecules of phenol to quinone. They find the properties and reactions of the phenoquinone can be readily explained by this structure, and that in most cases the properties are those of the hemiacetals.

The Chemical Kinetics of Oxidation: By H. Schlundt and R. B. Warder. Warder reviews the work of a number of investigators on oxidation processes and discusses the results obtained by Schlundt, treating his curves mathematically, and drawing some general conclusions as to the theory of oxidation processes.

Composition of Ohio and Canadian Petroleums: By C. F. Mabery. The author continues the report begun in the last number of this journal. He finds that both Ohio and Canadian petroleum contain small quantities of benzol, toluol and xylols. Both these oils resemble the Russian oil more closely than they do the Pennsylvania, and the Canadian oil has a smaller quantity of substances belonging to the methane series than the Ohio oil. The author refers to the various views as to the origin of petroleum and the difficulty of obtaining evidence on this point.

This number also contains reviews of the following books: Chemical Analysis of Oils, Fats and Waxes, R. Benedikt and S. Lewkowitsch; Analytical Chemistry, N. Menschutkin; Solution and Electrolysis, W. C. D. Whetham; Grundriss der Elektrochemie, H. Jahn; Grundzüge der wissenschaftlichen Elektrochemie auf experimenteller Basis, R. Lüpke; Practical Proofs of Chemical Laws, V. Cornish.

J. Elliott Gilpin.

THE MONIST, JANUARY.

Prof. Mach, in the opening article (his inaugural lecture delivered on assuming the professorship of the History and Theory of Inductive Science in Vienna) discusses the part which chance, or rather *accident*, has played in invention and discovery. He considers the general relations of science to philosophy, gives practical examples of the devious ways by which knowledge has been accumulated, and formulates the conscious and unconscious methods employed by scientific discoverers in their search for truth.

In *Pathological Pleasures and Pains* Prof. Th. Ribot applies the pathological method of amplification, as furnished by disease, to the study of abnormal pleasures, with interesting results.

Dr. Carus gives an exhaustive study of *Chinese Philosophy*, accompanied by numerous tables, diagrams and ideographic characters. He has interspersed his discussions with sufficient history to make the science and philosophy of the Chinese intelligible, and to exhibit the causes on which their intellectual stagnancy rests. He has considered thoroughly the Chinese theory of permutations (a theory of philosophy which is mathematical in its character), their supposed employment of the binary system of numera-