many would like to know exactly what he has accomplished. We have here a republication of 28 of the most important original articles, which appeared from the author from 1889 to 1902, in various German and American journals. Preliminary notices and communications, which appeared in collaboration with assistants and students, have been omitted in this publication. The German articles have been translated into English. It is, of course, impossible to discuss Loeb's work within the limits of this review, but the fields of his activity may be gathered from the following general topics: Heliotropism, heteromorphism and geotropism in animals; regeneration, the part played by the nucleus in cell oxidation; salt action; fertilization. It is interesting to note that Loeb has received the inspiration for much of his work from two related sciences. His beautiful early work on heliotropism and geotropism was apparently inspired by the corresponding work of Sachs on the botanical side. He showed that the laws laid down by Sachs for sessile plants hold perfectly for some of the lower forms of animal life as well. From this work the investigations on heteromorphism, regeneration, will and instinct developed. Then again, his work on salt action was apparently stimulated by the rise of the ionic theory of solution. Decidedly the most striking and far-reaching of his experiments are those on parthenogenesis, which are certainly epoch-making. He succeeded in producing normal larvae from the unfertilized eggs of the sea urchin. He found that an increase in the concentration of the sea-water as well as slight changes in the reaction could bring about this parthenogenesis. Later, the experiments on artificial parthenogenesis were extended to annelids. The subjects are written up in such a broad and highly suggestive way as to make them most readable. Loeb is at present too young and too vigorous an investigator to have his place among physiologists assigned to him, as we know not what he has in store for us. His work has, however, placed him in the foremost rank as an investigator, and his influence has been widely felt in physiology and the related sciences. This work would be a valuable addition to any physiological or biological library.

A. S. LOEVENHART.

FIRE ASSAYING NOTES. By F. P. DUNNINGTON, School of Analytical Chemistry, University of Virginia. 1905. Easton, Pa.: Eschenbach Printing Company.

This pamphlet is in the nature of a syllabus, no doubt designed

to give the subject-matter of a series of lectures in a course of assaying. Every other leaf is blank for the purpose of making notes by the student. It contains nothing new, and the presentation of the subject is not always satisfactory, and sometimes misleading; for instance, on page 7 the very inaccurate method of Berthier is given "to obtain the heating power of coal," and on page 8 the author says, "clay may be recognized by stirring the finely powered ore in water."

In the formulae for fire-assaying for gold and silver the quantity of ore to be used, in every case, is given in even numbers of grams, instead of so many assay tons or fractions thereof, as is now universally the practice, so that while this outline may be suggestive to those teaching the subject there seems nothing about it which particularly commands commendation. WM. HOSKINS.

THE CHEMICAL SYNTHESIS OF VITAL PRODUCTS, AND THE INTER-RELATIONS BETWEEN ORGANIC COMPOUNDS. BY RAPHAEL MELDOLA, F.R.S., V.P.C.S., F.I.C., etc., of the City and Guilds of London Technical College, Finsbury, etc. Volume I, Super Royal, 8vo. pp. xvi + 338. London: Edward Arnold. 1904. Price, $6.00 net; by mail, $6.22.

CONTENTS: Introductory. I, Historical. II, Nature of the Compounds Registered as Vital Products. III, Organic Chemistry from the Biocentric Standpoint. IV, Chemical Synthesis from the Biocentric Standpoint. V, Advantages of the Biocentric Treatment of Synthetical Chemistry. Hydrocarbons. Alcohols and Terpene Alcohols. Ketone Alcohols. Glycols and Polyhydric Alcohols. Aromatic Alcohols and Phenols. Aldehydes and Ketones: Fatty Group. Aromatic Aldehydes and Ketones. Carbohydrates and Glucosides. Sulphur Compounds. Cyanogen Compounds. Appendix: Camphor and Terpene Group; Flavone Group.

This work, upon which the author has been engaged for the past nine years, is a compilation of all those products of vital activity, which have been prepared synthetically. The natural sources and methods of synthesis are fully set forth, and, as the methods are given by which the generators of these vital products are obtained, the syntheses are in every case complete.

The author recognizes as "vital products" those "compounds of definite chemical composition which are known to be produced as the result of the vital activities of animals and plants, including micro-organisms," and the term "synthesis" is used to indicate both up-grade and down-grade processes. Reactions and schematic representations are omitted, to make the work more compact, but the arrangement of the substances is such that their genetic relations appear very clearly.