better understanding of the development of petrography, and to a fuller appreciation of its defects and needs, and will point out a way along which substantial advancement may be made in the future." W. F. HILLEBRAND.

ŒUVRES COMPLÈTES DE J.-C. GALISSARD DE MARIGNAC Tome I 1840-1860 Paris: Masson et Compagnie. Price, by subscription, 25 francs for the two volumes.

This is a beautiful volume of $8 + lv + 701$ quarto pages. Fifty-five pages contain a well-balanced and admirable account of the life and scientific labors of the great Swiss chemist, written with affectionate and well-controlled enthusiasm by his son-in-law. Then follow the earlier half of his scientific papers, which appeared before the end of the year 1860. Thirty-eight are memoirs reporting his own work, and twelve are notes commenting on papers of other scientific men which were closely related to subjects treated in his own papers. The order is chronological, and the paging of the original memoirs is reproduced in the margin.

Marignac was born in Geneva in 1817, and was professor of chemistry there from 1841, as well as of mineralogy also from 1845, till failing health put an end to his teaching in 1878. For perhaps five years longer, he was able to accomplish something in a private laboratory at his house; afterwards, till his death in 1894, he retained his full intellectual powers, and endured with fortitude a good deal of suffering.

Four of his papers were undertaken under the direction of Liebig, and belong to organic chemistry. A few relate to mineralogy; Marignac enjoyed pedestrian tours among the Alps, from which he brought back minerals which he loved to investigate. One paper concerns the theory of the famous experiment of Foucault in which the rotation of the earth is demonstrated by the change of the plane of motion of a free pendulum. One concerns the properties of sulphuric acid, and one describes a hydraulic blowing engine used in Westphalia; Marignac was *Ingenieur des Mines.*

The remaining papers of the present volume are all the work of a great chemist of splendid manipulative skill who devoted the best efforts of his life to the determination of atomic weights. Many were the elements for which his results will always be an

important part of our material. He gave values for no less than twenty-eight elements besides gadolinium, and also accomplished much crystallographic work, suggested by Mitscherlich's law of isomorphism, and bearing upon the formulae of compounds of silicic, titanic, tungstic and other acids. The determination of the atomic weights of cerium, lanthanum, didymium, and other elements, led to studies of the rare earths. A considerable labor on the specific heats of solutions of certain salts was also suggested by his interest in atomic weights. The Royal Society's catalogue makes us eager to see the papers remaining for the second volume, now about due.

It is much to be desired that this impressive record of the great work of an eminent chemist be made easily accessible in the United States. EDWARD W. MORLEY.

A LABORATORY OUTLINE OF GENERAL CHEMISTRY. By ALEXANDER SMITH, B.Sc., PH.D., Associate Professor of Chemistry in the University of Chicago. Second edition, revised.

The reviewer has read this laboratory guide with interest and pleasure. It has appealed to him as a teacher, who has followed practically similar methods in the instruction of beginners for many years, and naturally the process of development and the examples in experimentation have proved very attractive. It is scarcely to be expected that exceptions would not be found to the array of experiments and the modes of procedure—every teacher will make some exceptions, for each one has his own favorite solution of the problems confronting him, as has Dr. Smith; otherwise this little volume probably would not have been prepared in the face of the numerous existing guides upon the same subject. But one doubt shall be mentioned. It is that the exercises here and there seem to call for knowledge and manipulative skill beyond that which the beginner, absolutely ignorant of chemistry, possesses, and upon whose mind the truths deduced will not make the lasting impression for which every teacher so fondly hopes. It strikes one as if the course, pursued as laid down, would be splendidly adapted to students who have some knowledge of the subject and whose purpose it is to obtain a well rounded-out course in general experimental chemistry. Perhaps by the judicious selection of experiments and a final general review, omitting nothing, the main object would be attained. However,