

of these elements. The absence of calcium was carefully checked by Dr. R. B. Ellestad, to whom the writers are indebted for his help. It is significant that a magnesium phosphate can develop from calcium phosphate—the ivory has the structure of apatite—to the complete exclusion of calcium. This fact is particularly interesting as the mineral *hautefeullite* described by M. L. Michel² is said to be isomorphous with *bobierite*. It has been given the formula $(\text{Mg, Ca})_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$. Its actual analysis showed 5.71% CaO according to Michel.

The absence of Fe in the *bobierite* needs some explanation since it is isomorphous with *vivianite* $\text{Fe}_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$.³ Either the ground water which brought in the Mg contained no Fe or the latter was in the ferric state, which is improbable.

² *Bull. soc. franc. mineral.*, 16, 40 (1893).

³ Barth has also called attention to this in this journal, 22, 338 (1937).

BOOK REVIEW

ECONOMIC MINERAL DEPOSITS by ALAN M. BATEMAN, Professor of Economic Geology at Yale University. 898 pages, John Wiley & Sons, Inc., 1942. Price \$6.50.

This textbook deals with the origin and occurrences of mineral resources. The discussion of General Principles and Processes (Part I) constitutes the first half of the book and the remainder is almost evenly divided between Metallic Mineral Deposits (Part II), and Non-metallic Mineral Deposits (Part III).

The first four chapters of Part I cover general discussions of mineral deposits and include (1) Introduction, (2) Brief History of Economic Geology, (3) Materials and Modes of Formation, and (4) Relation to Magmas. These chapters comprise a resumé of the economic aspects of mineralogy, petrology, and general geology.

Chapter 5 contains the principal contributions of this book as a text in economic geology for the detailed discussion of Processes of Formation of Mineral Deposits covers 237 pages. The treatment follows a classification proposed by the author which is outlined under the following headings: magmatic concentration, sublimation, contact metamorphism, metasomatic replacement, cavity filling, sedimentation (exclusive of evaporation), evaporation, mechanical concentration, residual concentration, oxidation and supergene enrichment, and metamorphism. While most texts in economic geology contain much of the same material concerning the formation of mineral deposits, this chapter is undoubtedly one of the better presentations of the concepts because of its clearness, scope, and organization.

The next two chapters in Part I contain discussions of Controls of Mineral Localization, and Folding and Faulting of Mineral Deposits. The remainder of Part I consists of synopses on Classification of Mineral Deposits; International Relations and Conservation in Minerals; Geology in Prospecting, Exploration, Development, and Valuation of Mineral Deposits; and on Extraction of Metals and Minerals. The inclusion of these chapters in Part I makes it sufficiently comprehensive and independent that it might serve as an introduction to the subject of economic geology. This opinion differs somewhat from that of the author for he suggests that "For short courses in economic geology Parts II and III can be used separately from Part I. For longer courses all three parts can be used."

Part II considers the occurrences of various metallic mineral deposits and follows the customary arrangement of Precious Metals, Nonferrous Metals, Iron and Ferroalloy Metals, and Minor Metals. Most of the discussions are general and include (1) history, (2) production and distribution, (3) mineralogy, tenor, treatment, and uses, (4) kinds of deposits and origin, (5) examples of deposits in the United States, and (6) important deposits in other countries.

Part III concerns non-metallic mineral deposits and consists of brief discussions which include: (1) properties and uses, (2) production and distribution, (3) occurrence and origin, (4) extraction and preparation, and (5) examples of deposits. This part is subdivided into ten chapters on the basis of the principal uses in order to lend emphasis to the recent utilizations of these resources. Ceramic Materials, Metallurgical and Refractory Material, Industrial and Manufacturing Materials, and Ground Water Supplies are chapter headings which indicate the character of some of the trends. The other chapters are those which one would expect, such as Structural and Building Materials, Fertilizers, Abrasives, etc. Most of the chapters in Part III are 15-20 pages in length, but the one on Mineral Fuels contains 20 pages on coal and 40 pages on petroleum.

Selected references follow the discussion of each mineral resource and although the lists are not lengthy, they appear to be adequate for general purposes.

There are about 300 illustrations which include diagrams, cross-sections, and a few maps. Most of them have been well chosen and a number are new to the textbook field.

The text of the book proper contains 860 pages and the preface states that "Its chief purpose is as an elementary textbook, but it could be adapted almost equally well to more advanced courses. . . . The use of this book presupposes some knowledge of general geology and mineralogy." Difficulties may arise, however, in using it for elementary work, unless the students have had good preparation in mineralogy and petrology.

Economic Mineral Deposits adds to the variety of textbooks on economic geology by placing a new emphasis on principles and processes rather than by innovations concerning the geologic description of various districts and deposits.

CARL E. DUTTON

PROCEEDINGS OF SOCIETIES

NEW YORK MINERALOGICAL CLUB, INC.

Minutes of meeting held on Oct. 21, 1942

Professor William Lawrence Bragg, Dr. Leonard James Spencer, and Mr. Herbert P. Whitlock were elected to honorary membership by a unanimous vote of the members attending. Brief biographies of each of these men were read by Dr. Pough.

After the reading of annual committee reports, the balance of the meeting was devoted to talks by the members on their summer collecting experiences. The speakers were: Messrs. Morgan, Sampter, Northup, McKeown, Maynard, Marcin, and Trainer. One of the more outstanding specimens exhibited was Mr. Trainer's pseudomorph of quartz and epidote after large garnet crystals.

Meeting of Nov. 18, 1942

Miss Elizabeth Armstrong of the Department of Geology of Columbia University addressed the meeting on "Crystal Quartz in the Eastern United States." The crystallography of quartz was reviewed with special reference to the distinction between right- and left-handed crystals and the various types of twins. She then described the manner of occurrence of quartz crystals at Ellenville, N. Y., Herkimer and Montgomery Counties,