

bring into touch with one another candidates for positions and vacancies to be filled.

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SCIENTIFIC BOOKS

The Mineral Deposits of South America. By BENJAMIN L. MILLER, professor of geology, Lehigh University, and JOSEPH T. SINGEWALD, associate professor of economic geology, Johns Hopkins University. New York, McGraw-Hill Book Company, Inc. 1919. Pp. 598, with 61 figs.

South America is a continent richly endowed with mineral resources: In Brazil are the largest high-grade iron-ore deposits in the world; at Chuquicamata, Chile, is the largest copper deposit in the world and the copper resources of Chile are second only to those of the United States; the nitrates of Chile constitute a world monopoly of that commodity; the tin lodes of Bolivia are by far the most productive in the world, their annual output being seven fold that of their nearest competitor; the world's greatest vanadium deposits are in Peru; and the only considerable source of platinum outside of Russia is in Colombia. The mineral deposits are not only of great importance commercially but are also of deep interest scientifically; and, as the present book by Professors Miller and Singewald shows, not more than a beginning has been made in solving the geologic problems they present.

The book under review, as we are told in the preface, is "the outcome of an extended trip through South America made by the authors in 1915." It is essentially a digest of available information on the mineral deposits of that continent, supplemented, however, by data the authors obtained during the visits, necessarily hasty, that they made to many of the mineral deposits of Brazil, Chile and Peru.

The opening chapter of the volume gives an outline of the geography, general geology and mineral resources of South America. It sketches also the history of the growth of the mineral industry, discusses the relation of mining to other industries, and outlines the probable trend of the future development.

In view of the ground covered, the chapter, comprising thirty-two pages, is somewhat scant. It could be improved also by the addition of a series of outline maps of the continent showing quantitatively where the more important mineral commodities are produced, and by the insertion of statistical tables and diagrams showing the relation of South America's mineral output to that of the rest of the world. Such aids in giving the reader generalized views of the continent as a whole are conspicuously few in the present volume, but their urgent desirability should be considered by the authors when a new edition is planned. In places throughout the book there is an unnecessarily abundant use of local Latin-American terms, for most of which the authors could easily have substituted perfectly good English equivalents.

The remaining eleven chapters take up in alphabetical order the countries of South America. The description of the mineral resources of each is introduced by a summary of production. In places some statistical errors have crept in, as on page 77, where the outputs of lead, zinc and tin of Bolivia are given in terms of metal, whereas the figures cited are in reality those of ore or concentrate. Nor is it mentioned that the unit employed is the metric ton. These oversights are pointed out in passing, because current international statistics of mineral output are commonly vitiated by similar lapses. The summary of mineral production is followed by sketches of the topographic and geologic features of the country, of the distribution of the mineral deposits, and of the occurrence of the chief mineral resources. This general treatment is followed by more detailed descriptions of the important deposits and districts. Each chapter closes with a selected bibliography, the number of entries ranging up to 225 titles for the chapter on Chile. The entries are generally accompanied by brief synoptic characterizations. It is not always indicated that some Latin-American entries are merely translations of papers that appeared originally in French, German, American or other publications.

One of the notable sections of the volume

is the account of the Bolivian tin veins. Professors Miller and Singewald were fortunate in finding fossil plants in the shales at Potosi, and as a result of this discovery were able to establish that the tin veins at Potosi were formed in Pliocene or Pleistocene time. This is a remarkable conclusion and shows that these wonderfully productive tin lodes are in a geological sense extremely youthful; in fact they are probably the most youthful economically valuable mineral deposits of first rank in the world. Professors Miller and Singewald extend this age determination to all the Bolivian tin veins and maintain that they are all of Pliocene age. This conclusion may or may not be true, for the veins of the different districts appear to be associated with igneous rocks of a wide range of texture: pegmatites, aplites, granite, granite porphyry, rhyolite porphyry, rhyolite and "true quartz porphyry." As a matter of fact, no thorough field study of the Bolivian tin veins as a whole has yet been made. The studies hitherto made have been mainly petrographic, by geologists who have not collected the specimens they studied. It is not to be expected that a very deep insight into the fundamental problems could be attained by that method. Even in such a relatively subordinate matter as the nomenclature of the igneous rocks the petrologist has felt it necessary to use such obsolescent, non-committal terms as quartz porphyry to describe some of the rocks to which certain Bolivian tin veins are genetically related. When field work becomes the main method of attack and the microscope is used as an auxiliary—a powerful auxiliary it is true—more satisfactory results will be attained, and it is therefore a pleasure to learn that Professor Singewald is returning to Bolivia in order to take up a careful study of the tin veins in their broader geologic aspects.

Another district of special interest is Corocoro in Bolivia, which like the Lake Superior district is one of the world's two productive copper districts in which the chief ore mineral is native copper. Brazil holds the distinction of having in the Morro Velho mine the deepest mine in the world, the lowest workings

having attained a vertical depth of 6,128 feet. The ore on the lower levels averages nearly \$13 a ton in gold and indicates an extraordinarily long vertical range of gold-ore deposition. Apparently not much is known about the geology of this remarkable ore body, however. There are many other interesting deposits described in the book, but it would lengthen this review unduly even briefly to call individual attention to them. The outstanding feature of the economic geology of the South American continent is its preeminence in the number of its geologically youthful primary ore deposits of the first order of magnitude.

Professors Miller and Singewald have placed all interested in the mineral resources of South America under a deep debt for the labor they have expended in marshalling the widely scattered information and for presenting it attractively in a condensed and easily usable form. They can be gratefully assured that they have filled a genuine want in the literature of economic geology.

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THE ECOLOGY OF NORTH AMERICAN LYMNÆIDÆ

IN a recent paper in SCIENCE¹ the following statement appears: "There are three groups of limnæas found in North America, the abysmal limnæas including *Lymnæa (Acella) haldemani* Binney, the moss limnæas including *Lymnæa (Galba) truncatula* Müll., *humilis* Say, and the marsh limnæas including *Lymnæa stagnalis*, *L. columella*," etc. This classification of our pond snails is so unusual and so far from representing the true ecological relations of this group, as well as of the allied groups *Planorbis* and *Physa*, that a few observations on the subject seem necessary.

As far as known there are no abysmal limnæas or other fresh-water pulmonates in America, comparable to the true abysmal fauna of the deep lakes in Switzerland, where *Lymnæa stagnalis* occurs in Lake Geneva at a depth of 250 meters and *Lymnæa abyssicola*

¹ SCIENCE, N. S., XLVIII., p. 578, 1918.