SCIENTIFIC BOOKS

COPPER RESOURCES

Copper Resources of the World, Vols. I and II. 855 pages, 140 figures and 41 plates, 26.6 × 18.4 cm. XVI International Geological Congress, Washington, D. C., 1935. Price, $10.00.

FROM time to time the International Geological Congress publishes a comprehensive review of the resources of the world with respect to some mineral product of extreme economic importance. The contribution of its Washington meeting deals with copper. The committee in charge of the volume on copper states that "although this volume is primarily concerned with the geological environment of the known copper resources of the world, it has been thought that a clearer picture of these resources in their economic bearing could be presented by including a brief history of the development of the industry throughout the world, a discussion of the financial and economic factors of the industry, and an estimate of the amount of known reserves, with their geographical distribution." In addition there is included a brief description of some of the mining methods employed in the production of copper ores in North America, "as giving a picture of the current practice of a large and representative part of the copper industry."

The committee has succeeded, with the aid of many collaborators, in giving us a comprehensive and informational report on the world's copper resources and a prophecy as to the trend of the copper industry in the future.

Since 1840 the United States has produced 23,000,000 tons of the metal, or 55 per cent. of the world's production, but within the past decade, because of the discovery of large deposits of copper ores in the Belgian Congo and in Northern Rhodesia and the cheapness with which Canadian operators can separate copper from the gold ores of the Noranda area in Quebec and from the nickel ores in the Sudbury area in Ontario, this high percentage bids fair to be reduced markedly in the future.

Volume I deals with the deposits in North America and Volume II with those in South America, Europe, Asia, Africa and Australia. The total known reserves of the world's principal copper-producing companies has been estimated to be 3,536,242,832 tons of ore, with an average grade of 2.09 of copper, aggregating 73,934,300 tons of the metal, or enough to last about 70 years, provided the rate of production is that of the year 1929, which was about 1,185,780 tons. The four major known sources of supply are: (1) the Rocky Mountain and Great Basin area of the United States; (2) the west slope of the Andes in Peru and Chile; (3) the central plateau of Africa in the Belgian Congo and Northern Rhodesia, and (4) the pre-Cambrian shield area of central Canada and northern Michigan. These areas contain about 95 per cent. of the total known reserves. There are several areas of known copper ores in which the reserves have not been estimated and others in which the estimates have been increased, since the figures above quoted were calculated. Including these, Notman concludes that the present known reserves of the world are of the order of 100,000,000 tons of copper, and the average rate of production since 1929 has been about 1,450,000 tons. Since 1800 the United States has absorbed about 20,000,000 tons of the metal and there is known to be as much more available in the ground or about 300 pounds per person.

In addition to the reserves indicated in the above figures Notman states that it should be realized "that most of the proved districts contain many more millions of tons of the metal in material too low in grade to have been profitable in the past, but ready at any time for extraction when costs can be reduced or demand has increased to a point beyond the ability of the cheaper sources of supply to satisfy the needs."

The major portion of the book is devoted to descriptions of the geology of the districts in which copper-ore deposits occur, and discussions of the composition and nature of these deposits and the reserves known to exist in them. Sixty-eight individual collaborators and five organizations contribute to the discussions, producing a summary covering the entire world except for a few isolated districts in which information is lacking or in which the quantity of copper-ore known to occur is so small "as to be negligible so far as they may contribute to the world's output of the metal." The areas to which the largest paginations are devoted are Canada, Arizona, Chile, Peru and Africa.

The illustrations are mainly geological maps and sections and plans of mines. In addition to these there are eight reproductions of photographs.

The committee responsible for the plan of the volume and its contents are to be congratulated upon the result of their efforts. The report is a worthy companion of the coal, iron and gold volumes published during the past few years.

W. S. BAYLEY

THE LIFE OF J. ARTHUR HARRIS

J. Arthur Harris, Botanist and Biometrician. Edited by ROSENDAHL, GORTNER and BURR. University of Minnesota Press. Undated.

HERE is a book which every young biologist should

read. It sketches the life of a man of lofty ideals who made a lasting impress, not only upon science, but upon scientists.

The book tells a remarkable story, starting with the lad who trudged several miles over the dusty road in summer to pry open a schoolhouse window to obtain a definition of a word, and ending with the man who was head of the department of botany in the University of Minnesota. Harris later traversed many other wearisome roads and always with a worthy purpose in mind. He was fortunate in having worked in the first quarter of the present century when biological studies in America had such a great expansion. The records of such investigations in this period of fantastic growth are extremely important and we must be forever grateful to his colleagues who have cooperated to give us this little volume.

From 1907 to 1924 Harris was resident investigator in botany at the Station for Experimental Evolution of the Carnegie Institution of Washington, Cold Spring Harbor. During these years he pursued studies in variation, adaptation and natural selection, devoting a large portion of his time to the development of methods for statistical analysis of biological data. He will ever be renowned for his assiduous devotion to the quantitative study of biological problems, as well as for several very important contributions to biometric theory and computational techniques. He was obsessed with the necessity of putting biology on a more exact basis. He advocated the importance of biometry at a time when most biologists regarded that subject with indifference, not to say hostility. That he lived to see the growing interest in the subject and its inclusion in university curricula is most fortunate. Shortly before his death he wrote the following words as a summary of his program: "For nearly thirty years I have not been particularly interested in any one specific biological problem. I have been interested in what I felt was the more important problem, *i.e.*, the problem of the method of solving biological problems." This biographical volume also contains five posthumous papers on biometry and biometrical subjects.

Harris is also well known for his extensive studies on the physico-chemical properties of plant sap in relation to taxonomic affinities, to geographic distribution and to various ecological factors. Many interesting accounts of these investigations are related in this volume. We learn from it that a great mass of his results unfortunately were never published.

The versatility of Harris is also shown by various writings here recorded. The volume contains his delightful satire on the regimentation of science entitled, "A Great Institute for the Study of the Psychology of the Mule" and "Desert Beef," a parody on Hiawatha. His poem "To Pahvant," a volcanic butte, is an expression of refined sentiment for the majesty that exists in nature.

This volume will richly repay the reading by any one who wishes to know something about one of the most engaging personalities who lived and worked in one of the important periods of the biological sciences. It will not only instruct but will inspire its readers.

H. S. REED

UNIVERSITY OF CALIFORNIA

SOCIETIES AND MEETINGS

THE WEST VIRGINIA ACADEMY OF SCIENCE

THE thirteenth annual meeting of the West Virginia Academy of Science was held on the campus of Bethany College at Bethany on May 1 and 2, 1936. About 170 members were in attendance.

A general business session was held on Friday morning, at the conclusion of which the academy was welcomed by President Cramblet of Bethany. The presidential address, "The Life History of a Bone," was then delivered by Professor G. S. Dodds, of West Virginia University.

At noon the academy lunched by sections. In the afternoon the academy met in sections to hear a total of 53 papers read. At the section meetings the following chairmen were elected for the coming year: *Biology,* Professor R. C. Patterson, Potomac State College; *Chemistry,* Professor J. B. Bartlett, Marshall College; *Geology and Mining,* Professor H. C. Martens, West Virginia University; *Mathematics and Physics,* Professor R. P. Hron, Marshall College; *Social Science,* Group I, Professor E. L. Lively, Fairmont State College; *Social Science,* Group II, Professor Roy Woods, Marshall College.

A dinner was held in the evening, after which the academy met to hear the principal address of the meeting delivered by Professor H. B. Lemon, of the University of Chicago. Professor Lemon's subject was "Some Aspects of the Mystery of Light." Following the address an informal reception and smoker was held at the home of President Cramblet.

The final business session of the meeting was held on Saturday morning, at which time the following officers were elected for the coming year: *President,* Professor Frank Cutright, Concord State College; *Vice-President,* Professor T. L. Harris, West Virginia University; *Secretary,* Professor M. L. Vest, Davis and