

PROCEEDINGS OF SOCIETIES

NEW YORK MINERALOGICAL CLUB, INC.

American Museum of Natural History, New York City, January 17, 1940.

The meeting was called to order with 45 members present. The speaker of the evening was Edward Henderson of the United States National Museum, who addressed the Club upon "Meteorites and Meteorite Problems." He told the members about the collection at the National Museum, which has 53% of the 1340 known falls represented in specimens over 5 gm. in weight. He discussed the relationship of the Ni content to the pattern of the siderites and told of the work being done to learn more of the cause of the Widmanstätten patterns. He also recounted some interesting observations made in connection with recent falls and startling calculations of the size of the original mass. In addition to recording new finds, some of the research leads to grouping of meteorites originally considered as separate falls, as in the case of nine Chilean hexahedrites.

Mr. Henderson called attention to the interesting compositions of the olivines of meteorites; though intimately associated with iron, they are always nearly pure magnesium olivines. The same is true of the enstatite. Chondrules and brecciated structures also still require an explanation.

F. H. POUGH, *Secretary*

American Museum of Natural History, New York City, February 21, 1940.

The meeting was called to order with 70 members and guests present. Mr. Northup proposed the Easton quarry as the site for the Spring Excursion.

Following a brief business meeting, Mr. James L. Head of the Chile Exploration Company addressed the Club upon the "History and Development of Copper Mining at Chuquicamata, Chile." Mr. Head is well qualified to speak upon this subject as he has been intimately associated with the development of the mine during the last 16 years. Some porphyry mines may produce more tons of ore per day, but Chuquicamata is at present the greatest copper deposit on earth. It contains a billion tons of ore and over 40 billion pounds of copper. The deposit is 1.85 miles long with a maximum width of 3300 feet.

Chuquicamata is an old mine and even its name is of uncertain origin. A few Indians living on a nearby river made use of the turquoise and other colored pebbles for jewelry, but probably did not work the copper. The Spaniards undoubtedly mined the copper. Subsequently, intermittent operations exploited the higher grade ore until 1912 when A. C. Burrage of Boston and the Guggenheims started its modern development as the Chile Exploration Company. In 1923 control of the company was purchased by the Anaconda Copper Mining Co. As much as 59,000 tons of ore averaging about 1.63% Cu and 33,500 tons of waste have been removed in a single day.

Chuquicamata lies on a lesser chain of mountains to the west of the main Andean chain. The region has a complex geological history of intrusions and uplifts, with shattering and repeated mineralization. In the crushed zone many fractures developed in which the primary copper ores were deposited. The oxidized ore is not disseminated as in porphyry copper, but concentrated in innumerable fissures into which it spread after rising through the major fracture zone. The fissures vary from paper thickness to $\frac{3}{4}$ or 1 inch. The primary sulphides were probably pyrite, enargite, and covellite, together with minor amounts of chalcopyrite, tetrahedrite, bornite, and sphalerite. Uplift and arid climate has resulted in enrichment through oxidation and the formation of many rare and unusual copper and iron minerals. 95% of the ore is antlerite. Chalcantite, natrochalcite, kröhnkite, etc., are other important copper minerals.

Experiments at the Geophysical Laboratory have shown the importance of SO_3 in the oxidizing solutions as the controlling factor in determining which minerals will form. Chalcantite forms from solutions of high acidity; antlerite is characteristic of moderate acidity, brochantite of low, and CuO of very low. In arid climates, solutions are normally of higher acidity than those of humid climates, which explains the formation of the particular minerals at Chuquicamata. There are some high sulphide peaks where silica halos have protected them against oxidation. If these peaks eventually oxidize close to the surface, kröhnkite and natrochalcite, as well as chalcantite, will form as they are characteristic of high acidity. But in a feldspathic rock, with alkalis available, the acidity will rapidly diminish with depth, and antlerite soon replaces the other minerals.

Iron minerals have complicated the picture. Iron must be combined as limonite or jarosite before the copper minerals are free to separate out. Consequently, the copper minerals in solution have spread out before precipitation from the original place into post-mineral fractures. Such knowledge has turned out to be of great help in mining operations, as indicator minerals have now been determined. Much of this work has been done by O. W. Jarrel and is still unpublished.

The talk was illustrated by specimens and moving pictures, one reel of which was in color and very impressive.

F. H. POUGH, *Secretary*

MINERALOGICAL SOCIETY: LONDON

General Meeting held in the apartments of the Geological Society of London on March 7th, 1940. Mr. Arthur Russell, M.B.E., President, in the Chair.

The following papers were read:—

- (1) *Mineral localities on the Mendip Hills, Somerset.* By Mr. ARTHUR W. G. KINGSBURY.

A systematic examination of this district, over several years, has led to the discovery of a number of interesting minerals not previously recorded, and to the re-discovery and collection of further specimens of other rare species already noted in small quantities.

This paper describes a large number of the localities examined, and gives the general occurrences of minerals in the area.

- (2) *Colloidal gold as a colouring principle in minerals.* By Dr. J. NEWTON FRIEND and Mr. J. P. ALLCHIN.

Various factors to which minerals owe their colours are discussed. It is shown that traces of gold are present in many minerals, notably in coloured celestines and rock salts. It is suggested that the colours of these two minerals may be due to their gold contents, the gold being present in the colloidal state. No gold was detected in a ruby. Sufficient amount was present in Cropwell Bishop anhydrite to account for its blue cast. A specimen of pale bluish-green aragonite from Lunehead mine, Yorkshire, is identified as the variety mossttite. Its colour is due to copper.

- (3) *The composite dike at Brockhill, Worcestershire.* By Dr. J. H. TAYLOR (communicated by Dr. JAMES PHEMISTER).

The paper describes a small composite dike consisting of teschenite with thin quartz-dolerite margins intruded into the Downtonian in the valley of the River Teme in Worcestershire. The nature of the igneous and metamorphic rock types and their relations to one another are discussed, and the suggestion put forward that the quartz-dolerite has resulted from reaction between teschenitic magma and sediment.

(4) *Note on an occurrence of bertrandite and beryl at the South Crofty mine, Cornwall.* By DR. JAMES PHEMISTER.

A new locality for bertrandite and beryl in Cornwall is recorded. The minerals occur in a stanniferous veinstone and are recognizable only under the microscope. Aggregates of chlorite and bertrandite are associated with tourmaline peach and also form pseudomorphs after beryl. Beryl of a new generation occurs as prisms, needles and skeletal crystals in quartz.

(5) *Iron-rich kornerupine from Port Shepstone, Natal.* By Mr. J. E. de VILLIERS (communicated by the General Secretary).

Kornerupine, which differs from previously described material chiefly in having a higher ferric iron and lower magnesia content, is found in the Port Shepstone district, Union of South Africa. An analysis of this material shows that the composition of kornerupine varies between wider limits than hitherto known. The general formula $(R_3'', R_2''', R_6)_3(Si_3, B_4)O_{18}$ is deduced from the available analyses.

(6) *On maucherite (nickel-speiss, placodine, temiskamite).* By Dr. M. A. PEACOCK.

Chemical analyses and x-ray data for maucherite from Sudbury, Ontario, and Eisleben, Thuringia, are given. The mineral is tetragonal, a 6.84, c 21.83 Å, space-group D_4^4 or D_4^8 , and the unit cell contains $Ni_{44}As_{32}$. Walker's temiskamite is identical with maucherite.

BOOK REVIEW

MINERALOGIE IN SACHSEN VON AGRICOLA BIS WERNER. Die Ältere Geschichte des Staatlichen Museums für Mineralogie und Geologie zu Dresden (1560-1820), by WALTHER FISCHER. 356 pp., 24 pl., 18 text figures. C. Heinrich, Dresden.

During the 15th Century and later the Erzgebirge of Saxony was a rich and important mining area, yielding a wide variety of ores. Annaberg, Schneeberg, Freiberg, Altenberg, Johanngeorgenstadt and Zinnwald are among the most famous mineral localities known to all mineralogists. It is, therefore, natural that the interest in mineralogy should begin here early and that many important contributions to knowledge should stem from this region.

From Georg Agricola (1494-1555) through Werner (1750-1817) the story of Saxon mineralogy is followed in terms of the development of the Dresden collection, from the Kunstkammer of the Kurfürst August begun in 1560 to the modern scientific "Museum für Mineralogie und Geologie zu Dresden." Dr. Fischer, curator of the mineralogical and geological collections in the famous Zwinger, offers us, in this book, much more than an account of his institution, but a detailed chapter in the early history of our science, an account that all mineralogists can read with great interest. "Die Wissenschaft ist international, die Mineralogie aber ist sächsisch."

One half of the book (185 pp.) is given over to this historical development; the second half (115 pp.) is devoted to a series of notes, supplementing the text, devoted to collateral themes, with numerous references to old and difficultly accessible literature. A special item of interest of two pages quotes Neickelius' "Rules for Museum Visitors" of 1727, a series of 25 recommendations to help a visitor gain most from his visit.

This scholarly work has the imprint of much bibliographical research in old documents and early printed works, and should prove a valuable source book for the history of our science. It is, as well, an absorbing dissertation on mineralogical development and museum practice for casual reading.