

instrument. A study of the crystals of quartz (Sutrop), garnet (Fort Wrangel), idocrase (Wilui), topaz (Brazil), feldspar (Pikes Peak), and copper sulfate, serves to ground the student in the general methods of sketching a crystal, projecting and drawing it; also the graphic determination of the face symbols, the polar elements, and crystal system. Likewise the cutting of plaster of Paris models is introduced here.

With this preparation, the intricacies of Goldschmidt's two-circle reflecting goniometer are described. By examples of typical crystals measured on this instrument: topaz (Thomas Mountain), realgar (Felsöbanya), calcite, (Egremont), phenacite (Brazil), anorthite (Vesuvius), idocrase (Vesuvius and Ala), and pyrite (Binnenthal), the methods of calculation of the polar and linear elements, and of an angle table are detailed. The treatment of twin-crystals is illustrated by examples of spinel (Ceylon) and epidote (Ober-Sulzbach).

The text is concise, but clearly written, and abundantly illustrated with good figures. Tables useful in making gnomonic projections (when charts are not available) are appended, and there is a brief index to the volume.

SAMUEL G. GORDON

COMPOSITION-TEMPERATURE PHASE EQUILIBRIUM DIAGRAMS OF
THE REFRACTORY OXIDES. ROBERT B. SOSMAN AND OLAF ANDERSEN,
Research Laboratory, United States Steel Corporation, Kearny, New Jersey.
\$2.00 per set of four sheets.

The publication consists of four sheets, 24" by 19", reproducing in colors the four ternary composition-temperature diagrams of the four refractory oxides: silica, alumina, lime and magnesia. The scale is large enough to permit of interpolation to 0.1%. The base is a 500-millimeter equilateral triangle. The authors have recalculated the compositions and have replotted many of the original data of the Geophysical Laboratory, making minor revisions in the original diagrams to take account of later work, and have prepared the drawings by the same methods as are used for colored topographic maps. The base is in blue, temperature contours in green, compositions (including solid solutions) in red, and boundary curves and primary phases in black.

The sheets are now available at \$2.00 per set of four. Orders should be placed with the Research Laboratory, United States Steel Corporation, Kearny, New Jersey.

PROCEEDINGS OF SOCIETIES NEW YORK MINERALOGICAL CLUB

Minutes of the April Meeting, 1934

A regular meeting of the New York Mineralogical Club was held on the evening of April 18th, 1934, at the American Museum of Natural History. The meeting was called to order at 8:15 P.M. by President Hawkins. The attendance was 75.

The speaker of the evening was the retiring President, Dr. Alfred C. Hawkins, who gave a paper illustrated with charts and lantern slides on the subject of "The Distribution of the Heavy Minerals in the Coastal Plain Sediments of New Jersey." Dr. Hawkins described the methods of elutriation, that is, the washing of the clay

through tanks with a controlled water flow. The heavy minerals remaining in each tank would then be examined. The percentages of the three minerals most constantly present (tourmaline, ilmenite, and zircon) were quantitatively determined by counts of grains under the microscope. The plotting of the resulting figures areally on the map according to the localities from which the original clay samples were obtained, shows that there is a systematic areal increase or decrease of the various proportions of these minerals; that their distribution indicates that the clays were deposited by some stream or other water flow coming in at the north-west corner of the present clay area, in the general drainage of the lower Raritan and Hudson rivers. A similar plotting of the total carbon contained in the various clay horizons gave similar results.

Then followed a period of questioning and discussions concerning the characteristics of clays.

DANIEL T. O'CONNELL, *Secretary*

*Minutes of Testimonial Meeting to Professor Edward
Salisbury Dana on April 28, 1934*

A testimonial meeting of the New York Mineralogical Club in honor of Professor Edward Salisbury Dana, was held in the Maxwell Hall of the American Museum of Natural History on the afternoon of Saturday, April 28th, 1934. The meeting was called to order at 2:15 P.M. by President Gilman S. Stanton. The attendance was 90.

President Stanton introduced Dr. Alfred C. Hawkins, past President of the Club, who presented the engrossed certificate of honorary membership to Professor Edward Salisbury Dana, A.B., A.M., Ph.D., of Yale University. In the course of his remarks, Dr. Hawkins stated that the greatest monument which we might raise in memory of Professor Dana would be of slight consequence in comparison with the Sixth Edition of Dana's "System of Mineralogy," which came from the hand of Professor Edward Salisbury Dana.

Professor Dana modestly replied to the splendid tribute which Dr. Hawkins paid him, and proceeded to give all credit for his present reputation as a scientist to his father, James Dwight Dana, and his maternal grandfather, Benjamin Silliman. He traced the course of their lives and told how they had affected his own.

President Stanton then introduced Mr. Frederick I. Allen, past President of the Club, who spoke in praise of Professor Dana and his works, saying that "one of the happiest days of my life was the one on which I opened Dana's Textbook and Dana's 'System of Mineralogy' and that we see your face whenever we open a book with 'Dana' on the back."

The next speaker was Professor Alexander H. Phillips, Professor of Geology and Mineralogy at Princeton University. He also extolled the virtues of the 6th Edition of Dana's "System of Mineralogy," which he called the reference book of the world in mineralogy, in spite of the recently completed Hintze's extensive work in the German language.

The next speaker was Dr. Paul F. Kerr, who was also introduced by President Stanton. Professor Kerr told how, as he progressed in the field of mineralogy, he always found Professor Dana's books ahead of him. For the elementary student, Dana had written "Minerals and How to Study Them." One stage higher, he

found Dana's "Manual of Mineralogy." Still more advanced, he found Dana's "Textbook of Mineralogy," and finally, for the most advanced, Dana's "System of Mineralogy."

Dr. George I. Finlay, Professor of Geology at New York University, and author of a text on petrology and the study of rocks in thin sections, was next introduced by President Stanton. Dr. Finlay commented that Dana's "System of Mineralogy" was the Bible of the mineralogical field.

The last speaker was Dr. Bertram T. Butler, Professor of Geology of the College of the City of New York, who pointed out the great influence which Professor Dana has wielded over the youth of the country who have an interest in minerals.

The meeting adjourned, and the assembled members, accompanied by Curator Herbert P. Whitlock, retired to the Morgan Mineral Hall to view the collections there.

DANIEL T. O'CONNELL, *Secretary*

Minutes of the Meeting of May 16, 1934.

A regular meeting of the New York Mineralogical Club was held on the evening of May 16th, 1934, at the The American Museum of Natural History. The meeting was called to order by President Gilman S. Stanton. The attendance was 76.

Miss Catherine Schroder reported for the Membership Committee that their decision was favorable on the application of Mr. Charles H. Hale, Jr., of Kearny, N. J., and Dr. Frederic David Zeman, of New York, N. Y., and they were regularly elected to membership.

The speaker of the evening was Dr. Frank L. Hess, of the United States Bureau of Mines, Washington, D. C., who spoke on the subject "The Uranium and Vanadium Deposits of the Colorado Plateau." Dr. Hess pointed out that the important uranium and vanadium deposits of the United States are found in a great area of soft unaltered sandstones located in the Colorado Plateau, which lies between the Rocky Mountains on the east and the Wasatch Mountains on the west. The deposits are found scattered through an area stretching from Coal Creek and Blue Mountain in northwest Colorado southward and westward to Carrizo Mountain just south of the "Four Corners" where Colorado, Utah, Arizona, and New Mexico meet. In Utah, they are found along the east side of the San Rafael Swell, in the Henry, Blue, and LaSal Mountains. Within this area, there are long distances through which no deposits are found, however.

The principal uranium mineral is carnotite, usually found as a bright yellow powdery mineral disseminated through the sandstones. The Navajo Indians who lived in the vicinity are believed to have been the first to use this mineral, which they used to make a black dye. Although carnotite was probably recognized by the early prospectors, it had no value until 1898, when Gordon Kimball, a mining man of Telluride, Colorado, gave some of the yellow mineral to a French chemist named Poulot, who determined that it contained uranium. It was not yet known that the mineral also contained radium, which was discovered in the same year. Poulot passed specimens on to Friedel and Cummence in Paris, who found the substance to be a new hydrous potassium uranium vanadate, and they named it carnotite for the French chemist, Adolphe Carnot. Later, the green color of the LaPlata sandstones near Placerville, Colorado, was found to be due to the presence of vanadium.

Dr. Hess then discussed in detail the uranium and vanadium deposits in the several formations found in the vicinity, beginning with the Shinarump conglomerate, which contains quantities of fragmental tree trunks and boulders in cross-bedded sand. Part of the sand is made up of asphaltite grains. This asphaltite carries both uranium and vanadium.

Dr. Hess also described the so-called "butter balls," which are small masses of very pure carnotite.

Dr. Hess described his discovery of several minerals, including rauvite, a purplish massive uranium and vanadium mineral, uvanite, a mineral which corresponds closely to carnotite without potassium. He also found torbernite (copper uranium vanadate), halotrichite (iron aluminum sulphate) and a little erythrite the cobalt bloom.

Dr. Hess then continued with a description of deposits found in the LaPlata sandstones, which lie above the Shinarump conglomerate stratigraphically. A thin, unevenly bedded limestone divides the formation into two parts and immediately below the limestone large flat lenses of the sandstone are cemented by the vanadium mica roscoelite, which gives them a dark green color. The lenses are enclosed within sandstone of a light green color, due to mariposite, the chromium-bearing muscovite. Directly above the LaPlata formation is the Morrison formation, containing most of the carnotite deposits, which, from 1907 to 1920, furnished most of the world's radium. The deposits in all cases are found in the vicinity of plant remains in this formation. The commonest mineral in all the deposits is roscoelite, but instead of being greenish as in the rocks below, it is gray or black.

On the south side of Paradox Valley, near its head, masses of sandstone are colored black by the mineral vanoxite, which forms tiny prisms between the sand grains. At other places, the sandstone is impregnated with spots of carnotite and others of vanoxite, and such ore is known to the miners as "rattlesnake ore." No carnotite deposits are found in the Morrison formation without vegetal matter, except where they can be shown to have been moved by percolating waters. Dr. Hess called it a shallow inland sea, with organic matter which trapped the metals as they weathered from the old veins, of which even the roots have disappeared. The waters draining the slopes leading to the lake or sea reached the veins found in the rocks and carried small amounts of uranium, vanadium, pyrite, chalcopyrite, and other minerals down. The oxidation of sulphides would form sulphuric acid, which would dissolve the uranium and vanadium and carry them into the lake, probably accompanied by some selenides.

After Dr. Hess concluded his talk, a period of question and discussion followed, participated in by Mr. I. O. Lee, Dr. Blank, Mr. Allen, and Mr. Radu.

DANIEL T. O'CONNELL, *Secretary*

NEW MINERAL NAMES

Graebite

ALFRED TREIBS AND HERMANN STEINMETZ: Über das Vorkommen von Anthrachinon-Farbstoffen im Mineralreich (Graebite), *Justus Liebigs Annal. Chem.*, vol. 506, 171-195, 1933.

CHEMICAL COMPOSITION: A polyhydroxyanthraquinone, about $C_{18}H_{14}O_8$ or $C_{17}H_{14}O_8$. Analysis on pure orange red crystals (1.285 mgs.) C 55.71, H. 3.18. Soluble in chloroform and benzol-ligroin. M. P. 245°.