PROCEEDINGS OF SOCIETIES

PHILADELPHIA MINERALOGICAL SOCIETY

The Academy of Natural Sciences of Philadelphia, March 6, 1941.

Dr. Thomas presided, with 58 members and visitors present. Dr. Michael Fleischer of the U. S. Geological Survey addressed the society on "The Role of Hydrogen in Minerals." Pressure-temperature data are obtained by carefully controlled heating methods and the results are plotted. An *x*-ray analysis will reveal the possibility of the water being either a part of the structural lattice or merely adsorbed. There is a great variance in the amount of energy that binds the hydroxyl to the crystal lattice. Interlayered water will cause minerals such as bentonite to expand along the *c*-axis on heating, without changing the lattice.

FORREST L. LENKER, *Secretary*

Academy of Natural Sciences of Philadelphia, April 3, 1941.

President W. Hersey Thomas presided with 64 members and visitors attending.

Dr. A. F. Buddington of Princeton University was the speaker of the evening, his subject was "Mineral Specimen Localities of the Adirondacks, with Special Reference to their Genesis." He described the work done by William Agar and himself some years ago in relocating some of the deposits with the aid of the notes of C. D. Nimms, a mineral collector of the late 19th century.

Dr. Buddington described briefly the general geology of the area—Grenville sediments, mostly limestones intruded by granites and syenites, the well crystallized minerals occurring at or near the igneous rock contacts with limestone. The mineral associations, with apatite, tourmaline, danburite and others containing various volatile elements, show that emanations from the cooling igneous rocks were largely responsible for most of the mineralization.

One purpose of this study was the determination of the temperatures of the granitic and syenitic magmas at the time of their intrusion. This was accomplished by noting the character of the metamorphic minerals in their vicinity. At the granite-limestone contacts were developed: garnet, microcline, albite, tremolite, brown tourmaline, pale pyroxenes, and scapolites of the marialite-mizzonite range. At the syenite-limestone contacts are found: perthite, wollastonite, dark pyroxenes, and scapolites of the wenerite-meionite range. These mineral associations indicate that the syenite magma was of higher temperature than the granite magma.

Dr. Buddington took up the description of the individual mineral localities in order of their temperature of formation. Zoning of the ore-deposits according to temperature stability ranges of their minerals is quite conspicuous in the area. For instance, the magnetite deposits of Port Henry and Lyon Mountains are limited to the granite core. All of the iron was precipitated from the late hydrothermal solutions before these reached the surrounding limestones. However, the core was too hot for the precipitation of lead and zinc minerals, so these entered and replaced the limestones, as at Edwards and Balmat.

The Balmat deposit presents many interesting problems. In the Grenville limestone are found halite, and anhydrite. These suggest the possibility of interbedded halite and anhydrite of Archean age. Methane gas is also present in the workings, suggesting the presence of organic material. Also present are secondary sphalerite, willemite, hematite, ilvaite, and chlorite. These seem to be due to groundwater alterations and were attributed

by the speaker to downward penetrations of groundwaters from a surface exposed before the deposition of the Cambrian Potsdam sediments, roughly one half billion years ago. He attributes the hematite deposits of the Antwerp type to the alteration of gossans formed before the deposition of the Potsdam, which preserved them until the present. Where the protective coating of sandstone had been eroded from pyritic shales, only small limonitic gossans are found.

At higher temperatures silica-bearing solutions reacted with dolomitic beds in the limestone-forming tremolite. As temperatures dropped some of the tremolite was altered to talc forming deposits of economic value, as that near Edwards. Some of the manganese tremolite, hexagonite, is found here.

Black iron-bearing tourmaline such as is found at Pierpont is limited to the pegmatites, whereas the brown magnesium tourmaline, which is found near Gouverneur, is limited to the limestones, showing again that the iron was not able to leave the warm igneous rocks.

The speaker gave his views on the origin of the garnets of the Gore Mountain deposit. The ordinary gabbro of the Adirondacks suffered compression from mountain building forces at a temperature of about 600°C. in the presence of chlorine, which favored migration of the constituent elements. At first garnet formed a rim between grains of hypersthene in contact with labradorite, and the pyroxene was changed to augite. Where the reaction went to completion under favorable conditions, concretionary garnets formed, leaving the surrounding minerals purified of garnet constituents. Since the garnets grew under stress, they now have a well defined jointing which causes them to break into sharp angular fragments favoring their use as abrasives.

Dr. Buddington illustrated his discussion with lantern slides and answered many pertinent questions.

LOUIS MOYD, *Acting Secretary.*

DR. OLAF ANDERSEN, professor of petrographic analysis at the Stevens Institute of Technology, died on July 18 at the age of fifty-seven years.