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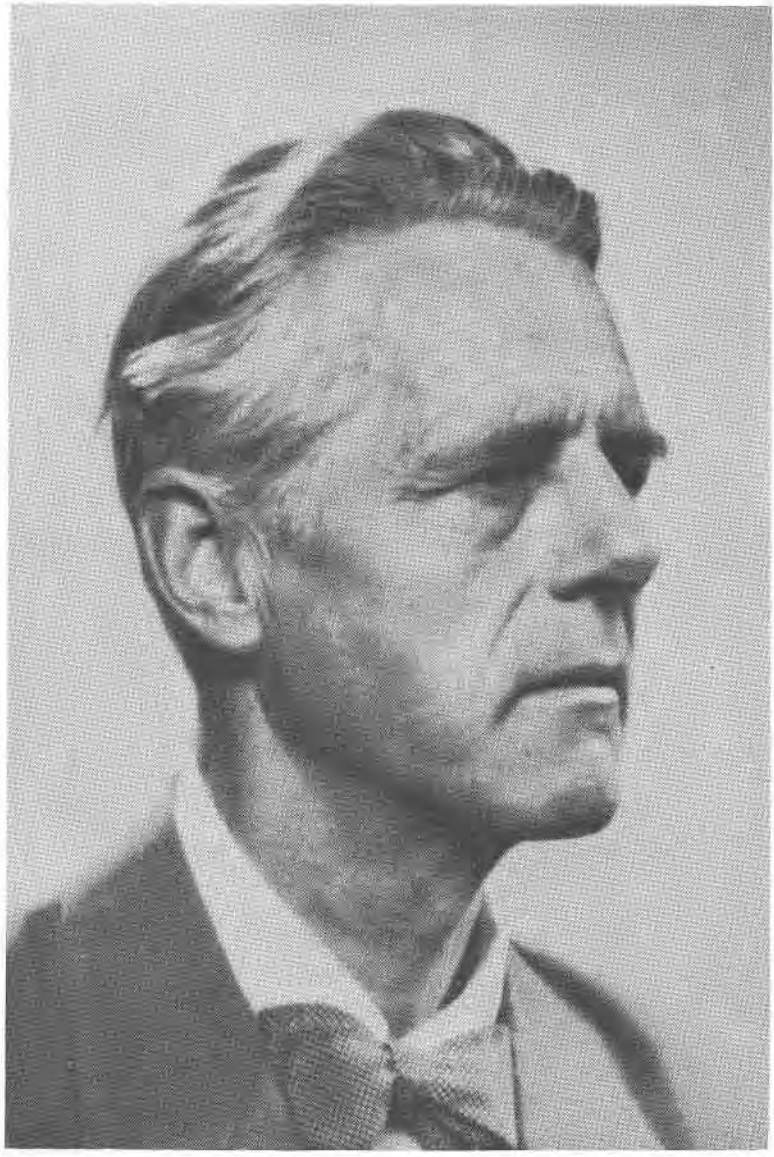
PRESENTATION OF THE ROEBLING MEDAL TO TOM. F. W. BARTH

GEORGE TUNELL, *University of California, Los Angeles, California.*

Mr. President, Fellows and Members of the Mineralogical Society of America, and Guests:

In 1936 the Council of the Mineralogical Society of America directed that a gold medal be designed in honor of Colonel Washington Augustus Roebling, a noted civil engineer who had long been interested in mineralogy and who had served as Vice-President of the Society in 1924. The Council further indicated that this medal was to be awarded for important contributions to the mineralogical sciences both in the United States and in other countries.

The award this year will be the nineteenth and the first to a Norwegian mineralogist. The person selected by the Council to be the recipient, Prof. Tom. F. W. Barth, was born in Norway in the town of Molde in 1899. A few months later he was taken to Bosekop, a small settlement near the North Cape, where he lived until he entered school at Trondhjem. In 1919 he entered the Royal Frederic's University in Oslo, and there became a student of Prof. W. C. Brøgger, whose investigations of the igneous rocks of the Oslo province are classical. As early as 1894 Brøgger had concluded that within a series of congenetic igneous rock types, the differentiation was determined by the laws of crystallization. From 1924 to 1927 Barth came under the stimulating influence of Prof. V. M. Goldschmidt and participated in some of Prof. Goldschmidt's researches on crystal structures and the geochemical distribution of the elements. In 1927 he received the degree of Doctor of Philosophy from Oslo University. In 1927 and 1928 he was an Assistant Professor in the Technische Hochschule in Berlin and in 1928 and 1929 he held a similar position in the University of Leipzig. From 1929 until 1936 he was a member of the scientific staff of the Geophysical Laboratory of the Carnegie Institution of Washington. In 1936 he returned to Norway to become a Professor in Oslo University and Director of the Mineralogisk Institutt, and he held these positions through the Second World War. For a time he was confined in a prison camp by the German army along with many other members of the University faculty, but his scientific research was continued in spite of many handicaps. In 1946 Dr. Barth joined the faculty of the University of Chicago as Professor of Geochemistry, but after three years he returned once more to his native land to assume the post of Director of the Mineralogisk-Geologisk Museum and to resume the position of Professor in Oslo University. Since then he has left Norway only briefly.



Tom. F. W. Barth

Dr. Barth's researches have covered a wide range of subjects in mineralogy, petrology, and geochemistry. His *x*-ray study of perovskite and dysanalyte in 1925 showed that their atomic arrangement is a simple one of approximate cubic symmetry, but actually of lower symmetry. A few years later in collaboration with Dr. E. W. Posnjak he determined the atomic arrangement of ilmenite. Its structure is similar to that of hematite, but its symmetry was proved to be lower because an atom of titanium takes the place of every other iron atom in the hematite unit cell. A very comprehensive investigation of the structures of the spinel group of minerals and related artificial compounds was carried out by Dr. Barth and Dr. Posnjak in the course of which they discovered that, while some of these minerals have the classical type of structure described by W. H. Bragg and by S. Nishikawa for spinel and magnetite, on the other hand magnesioferrite and several related artificial compounds have a remarkably different structure. In magnesioferrite 8 of the trivalent iron ions occupy one set of equivalent positions and the other 8 trivalent iron ions together with the 8 divalent magnesium ions are statistically distributed over one set of equivalent positions in a disordered manner. Previous to the work of Barth and Posnjak it had not been recognized that in a pure chemical compound atoms or ions of two or more chemical elements might be distributed statistically in a disordered way over one set of equivalent positions. An *x*-ray investigation by Dr. Barth of the sodalite family of minerals in which variate atom equi-points are also present, cleared up confusion of long standing concerning the chemical formulas of noselite and haüyne and gave an accurate picture of the atomic arrangements in these minerals.

I have mentioned some of the *x*-ray researches of Prof. Barth first, because I am more cognizant of his crystallographic contributions than of his field investigations. From his student days, however, he has spent much time mapping the igneous and metamorphic rocks in numerous Norwegian and American areas and working out their petrogenetic relations. As a result of his studies of the plutonic rocks in the Oslo Province, Barth concluded that the development of the principal plutonic rock series of this Province was conditioned by the development of various mineral reaction series, particularly by the two reaction series of the feldspars.

He has also carried out extensive investigations of the granitic and gneissic rocks of southern Norway near Kristiansand and determined the approximate temperatures at which they were formed by the use of the distribution ratio of soda in coexisting feldspars as a temperature indicator. Barth's general conclusion is that the pre-Cambrian granites of southern Norway were mostly formed by anatexis, although there are

three granitic bodies in this region that exhibit sharp contacts and that crystallized at temperatures about 150° C. higher than those at which the encasing gneisses were metamorphosed; these three granitic masses he believes were emplaced as hot crystalline bodies. In a petrographic investigation of basalt lavas from many parts of the world Barth has shown that the various types have originated mainly by crystal fractionation, and he further demonstrated that in almost all basaltic lavas only one pyroxene is present, the composition of which shifted progressively from diopsidic to clinohypersthenic during the process of differentiation.

While Dr. Barth was a member of the staff of the Geophysical Laboratory, he became interested in the work of Dr. A. L. Day, Dr. E. T. Allen, and Dr. H. E. Merwin on the hot springs, geysers, and fumeroles of the Yellowstone National Park. With the encouragement and support of Dr. Day, who was at that time the Director of the Geophysical Laboratory, he undertook a comprehensive investigation of the volcanic activity, hot springs, and geysers in Iceland which is reported in a magnificently illustrated monograph constituting Carnegie Institution of Washington Publication Number 587. In the conclusion of this work Barth states that: "The volcanic hot springs of Iceland form an evolutionary series from acid to alkaline (pH 2→9). The acid springs are rich in 'volcanic' gases—hydrogen, hydrogen sulfide, and carbon dioxide—and contain very small amounts of nitrogen. In the course of evolution, hydrogen sulfide and hydrogen are consumed by wallrock alterations and by oxidation. Thus springs rich in carbon dioxide are formed. Eventually the carbon dioxide is consumed also, and springs emerging at great distances from the volcanic centers, for instance in Tertiary basalt, usually contain more than 99 per cent nitrogen plus argon. Such springs have clear water and show alkaline reaction." Barth's findings for the Icelandic hot springs are thus in very good agreement with those of Day, Allen, and Merwin for the hot springs of Yellowstone National Park.

I have attempted to touch upon but a few of Prof. Barth's scientific contributions, which are embodied in a long series of scientific papers, several monographs, and a well balanced treatise on petrology. His achievements have been recognized by the University of Copenhagen, which awarded him an honorary doctoral degree in 1950, and by the University of Nancy, which awarded him an honorary doctoral degree in 1960. In 1959, on his sixtieth birthday, the Norwegian government conferred upon Prof. Barth the Royal Order of St. Olav, the highest honor that it awards for civilian achievement. He is a fellow of the following royal academies: Norske Videnskaps Akademi, Oslo, Norway;

Kungliga Fysiografiska Sällskapet, Lund, Sweden; Kongelige Videnskabs-Selskab, Copenhagen, Denmark; Royal Society of Edinburgh, Scotland. He is an Honorary Member of the Geological Society of London, of the Geological Society of Belgium, and of the Geological Society of France, a Corresponding Member of the Geological Society of America and of the Geological Society of Finland, a Member of the Geological Society of Norway, of the Geological Society of Sweden, of the Geological Society of Denmark, of the Deutsche Mineralogische Gesellschaft, of the Geochemical Commission of the International Union of Chemistry (of which he was also President in 1957–1960), and of the Geochemical Society (of which he was also President in 1960). And finally he is a Fellow of the Indian Mineralogical Society and of the Mineralogical Society of America.

Mr. President: It is a great pleasure as well as a valued privilege to introduce my old friend and former colleague, Prof. Barth, for the award of the Roebling Medal.

PRESENTATION OF THE ROEBLING MEDAL BY PRESIDENT MURDOCH

Thomas Frederick Weybye Barth, geologist and mineralogist, distinguished for your investigations in a wide range of subjects, notably the x-ray determination of unusual crystal structures, the course of differentiation in basaltic lavas, and demonstration of the reaction series in the alkali feldspars: it is my pleasure as President of the Mineralogical Society of America to present to you the Roebling Medal in recognition of these achievements.

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ACCEPTANCE OF THE ROEBLING MEDAL

T. F. W. BARTH.

President Murdoch, Dr. Tunell, Fellows, Members, Guests:

In the first book of Confucious which was written about 2500 years ago, there is a passage saying: "Isn't it a pleasure to have friends who come from far away to visit you." This year I have been visited by thoughts and by letters from friends who live far away.

When I received the letter from our president, Dr. Murdoch, stating that you had selected me as the recipient of the Roebling Medal, it was a message from the other side of the globe giving me a pleasant shock. After some reconsideration it occurred to me that it was not, perhaps, so much myself, as it was my teachers and friends in many lands whom the Council of the Society wanted to honor; for this, I thank you from a full heart.