

Presentation of Roebling Medal of the Mineralogical Society of America for 1972 to Elburt F. Osborn

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Mr. President, Members of the Society, Guests:

It is a privilege and honor and a great personal pleasure to introduce for the highest award of The Mineralogical Society of America my former teacher, research supervisor, administrative chief, colleague, advisor, and friend, E. F. Osborn.

This year's Roebling Medalist is a remarkably versatile individual. If he were in the world of sports he would be known as the man who could play every position on the team and be an All-American in any one of them. In his academic career at Penn State he excelled as a teacher, researcher, and administrator, first as Division Chairman, then as Dean and finally as Vice President for Research. His versatility is further illustrated by the fact that he has served as president of scientific societies covering the range from the American Ceramic Society to the Geochemical Society, the Society of Economic Geologists, and our own Mineralogical Society of America. Obviously, he is a tremendous organizer, not only of other people but also of his own mind. Without his immediate grasp of the essentials of a problem and the wise disposition of his time, he could not have combined his extensive administrative duties with first-class scientific work. It is for the latter achievement that we honor him today, and specifically for his contributions to mineralogy and petrology.

E. F. Osborn was born in Kishwaukee, Illinois, on August 13, 1911. He earned his B.A. degree from DePauw University in 1932, his M.S. degree from Northwestern University in 1934, and his Ph.D. degree from the California Institute of Technology in 1937. After serving as a mining geologist in Val d'Or, Canada, for one year, he joined the Geophysical Laboratory of the Carnegie Institution of Washington as a petrologist in 1938. Following an interlude as a physical chemist for the National Defense Research Committee during World War Two and a stint as Research Chemist with the Eastman Kodak Company after the war, he came to Penn State in 1946 as Professor of Geochemistry and Chairman of the

Division of Earth Sciences. In 1953 he was named Dean of the then College of Mineral Industries at Penn State and in 1959 became Vice President for Research, a position he held until 1970 when he was appointed by President Nixon to be the Director of the U. S. Bureau of Mines.

Like so many other outstanding petrologists, Dr. Osborn was first introduced to experimental work at the Geophysical Laboratory of the Carnegie Institution of Washington. His publications from this period, some of them jointly with Frank Schairer, are models of careful, extensive and detailed studies of silicate equilibria, contributing to an understanding of paths of crystallization in systems involving extensive solid solubility among the phases.

The transition to academic life in 1946, when sources of funding for research in petrology were scarce, would have been a difficult one for most researchers, but not for Ozzie. With his typical enthusiasm and ability to pick a theme and play it well, he succeeded in attracting research support from the Eastman Kodak Company, the American Iron and Steel Institute, the Bethlehem Steel Corporation, the Office of Naval Research, and other sources. I suspect that Ozzie in this endeavor was guided to a considerable extent by a verse found in Ecclesiastes, which, very appropriately for a minister's son, he has quoted himself occasionally: "Cast thy bread upon the waters: for thou shalt find it after many days." The bread that Ozzie cast upon the waters consisted largely of iron oxide, with some CaO, MgO, Al₂O₃, TiO₂ and SiO₂ as additional ingredients. Out of this has come a comprehensive knowledge of the role of iron oxides in petrologically important systems, because petrologists, after all, deal largely with the same oxide components as do steelmakers, only in different proportions. Fortunately for Penn State, and for our field of science, Ozzie was able to transfer into university research much of the approach, methods and spirit of the Geophysical Laboratory. In so doing, he not only created the strong effort in petrology at Penn State, but he actually pioneered

experimental petrology as a university discipline. There is no question that his success in building up experimental facilities and a competent staff at Penn State served as a stimulus to other academicians and institutions, and thus in no small measure contributed to the rapid growth of experimental petrology during the next 25 years. Hence, Osborn's experimental studies had a profound impact on the directions of petrological research even before he had completed, evaluated and published the results of his most significant petrological studies.

Osborn's early studies at Penn State were aimed at sharpening the tools and at providing the necessary physicochemical and crystal-chemical background for an attack on major petrological problems. His work on phase relations in model fluoride systems provided valuable insight into fundamental crystal-chemical relations so important for an understanding of liquid-solid equilibria in rock-forming systems. His excursion into relatively simple water-containing systems provided useful data on selected oxide-water combinations, but, more importantly, provided him with first-hand knowledge and experience about the behavior of water as a component in oxide systems, a subject of paramount importance for his later development of a comprehensive picture of the petrogenesis of igneous rocks.

Following these detours into related fields, Osborn would always return to his main area of work, the studies of liquid-solid equilibrium relations in relatively complex dry silicate systems with a bearing on petrological problems. Together with his graduate students and research associates he delineated phase relations in a number of key silicate systems, leading up to the research contributions for which he is particularly well known: his penetrating analysis and clear exposition of crystallization and differentiation trends of magmas. In a series of papers in the late fifties and in the sixties he utilized and further developed concepts derived in cooperation with his associates and beautifully described the role of oxygen potential in the petrogenesis of igneous rocks. Let me mention a few of these papers:

Role of oxygen pressure in the crystallization and differentiation of basaltic magma, *American Journal of Science*, **257**, 609–647 (1959);

Reaction series for subalkaline igneous rocks based on different oxygen pressure conditions, *American Mineralogist*, **47**, 211–226 (1962);

and his presidential address delivered to the Geochemical Society at Mexico City in 1968,

The complementariness of orogenic andesite and alpine peridotite, *Geochim. et Cosmochim. Acta*, **33**, 307–324 (1968).

Of course nobody in the field of petrology, not even Ozzie, can make believers out of everybody. However, I think everybody agrees that he has introduced very stimulating new ideas, inspired a lot of other investigators, and exerted a strong influence on this field during his entire academic career.

A scientist and administrator of E. F. Osborn's stature is called upon to participate in many public service functions, both locally and nationally, and he has certainly given very generously of his time and energy in this respect. He has served on a multitude of national committees and panels, among which I will only mention a few: Chairman of the National Research Council Committee on Mineral Science and Technology; NRC Committee on Engineering Aspects of Environmental Quality; NSF Earth Sciences Panel; Advisory Panel for Physical Sciences Facilities; Chairman of National Association of State Universities and Land-Grant Colleges Special Senate Committee for Mineral Resources. He is a member of the board of the Pennsylvania Research Corporation and of the Geisinger Medical Center in Danville, Pennsylvania, and he served as officer of the local chapters of several professional societies during his stay at Penn State. He has developed considerable experience and expertise in receiving awards and honors. Let me only mention a few: Membership in the National Academy of Engineering; the Regional Technical Meetings Award of the American Iron and Steel Institute in 1954; Honorary Life Memberships in the American Ceramic Society and the Canadian Ceramic Society; Honorary Doctor of Sciences degrees from Alfred University, Northwestern University and DePauw University.

How Ozzie can get all his jobs done, and done so well, and still maintain his relaxed and cheerful disposition, is a major mystery to most of us. Perhaps his additional, less publicized, geochemical-mineralogical interest, his soil-sampling activities at Centre Hills Country Club, helps maintain internal equilibrium in his system. I am sure it comes as no surprise to you that he swings his golf-clubs with the same smoothness and accuracy that characterize his other activities. His smooth swing and excellent control of the ball are invaluable in his new position at the U. S. Bureau of Mines where the fairways are very long and narrow, the roughs are very rough and the traps are filled with coal dust. At Penn State we

received the news of his appointment as Director of the U. S. Bureau of Mines in 1970 with mixed emotions, not because we doubted that good men were needed in Washington, but because we could ill afford to lose him at Penn State. We found considerable comfort in the fact, however, that the tenure of Directors of the U. S. Bureau of Mines recently had tended to be very short and that Ozzie probably

would be back at the University before long. This, of course, has not materialized—yet—, but I am keeping a Research Assistantship open for him in the unlikely event that he hooks or slices one of his shots in Washington.

Mr. President, it is a great pleasure to present to you the Roebling Medalist for 1972, Dr. Elburt F. Osborn.

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Acceptance of the Roebling Medal of the Mineralogical Society of America for 1972

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Arnulf, President Yoder, members of the Society and guests:

It is naturally a pleasure to be honored by the Mineralogical Society, and to join the company of those who have been previous recipients of the Roebling Medal. I think particularly of A. F. Buddington, who was the recipient the last time the Geological Society of America met here in Minneapolis. I had the good luck of spending a little time with this distinguished petrologist in the field in the Adirondacks during the summer of 1940. He has been a great inspiration to many of us. Earlier in his career, in 1919 and 1920, he was a member of the staff of the Geophysical Laboratory of the Carnegie Institution of Washington, where he studied phase relations of the melilites, a subject I continued some years later.

In looking back over the list of Roebling Medalists, I find that over 25 percent of them served for at least a year or two, if not their entire professional lives, at the Geophysical Laboratory. This laboratory has been a unique institution. It was established as one of the principal laboratories of the Carnegie Institution of Washington, shortly after the latter was founded in 1902. Carnegie's wish was that these laboratories should be dedicated to the discovery of new knowledge of general interest to humans, but not directed to industrial problems. Carnegie made