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Presentation of the Roebling Medal of the Mineralogical Society of America for 1979 to W. H. Taylor

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President Wones, members and guests of the Mineralogical Society of America:

Crystallography and mineralogy have a remarkably symbiotic relationship, and since 1937 about ten crystallographer-*cum*-mineralogists have been awarded the Roebling Medal. Today we gather together to honor a great pioneer, W. H. Taylor, whose researches over four decades established the structural features of the feldspar, zeolite, and aluminosilicate minerals.

Nowadays we blithely submit a set of diffraction data to a computer and confidently await a least-squares refinement. We feel sure that we can interpret the atomic positions in terms of chemical properties, and that we can make an estimate of the thermochemical properties. But let us step back to the year 1928. Home-made X-ray machines, unsophisticated cameras, insensitive film, trigonometrical tables—these were the tools. The principles of ionic and covalent bonding were gradually becoming clear, but topological ideas on the linkage of polyhedra had not yet blossomed.

Then along comes W. H. Taylor, a recent graduate working for his Ph.D. in Bragg's laboratory at Manchester University, that cradle of so much English science, and in three years knocks off chondrodite, sillimanite, kyanite, andalusite, norbergite, and analcime. But there's even more: the papers are written in a beautiful and simple prose, and the structural descriptions are elegant and penetrating. Next the structures of apophyllite (1931) and the fibrous zeolites (1933) are revealed, and a paper appears on the coordination number of aluminum in the aluminosilicates. Some doubters questioned the five-fold coordination of aluminum in andalusite, but structure analyses of greater refinement by Taylor himself in 1939 and by Burnham and Buerger in 1961 confirmed the original structure. It is indeed hard to believe that Taylor could have obtained such accurate coordinates with the data available in 1929. Some crystallographers have suspected the intervention of supernatural powers, but Taylor maintained a dignified silence.

Lesser mortals eat goose and plum duff on Christmas Day, and fall asleep afterwards, but Taylor solved the nagging problem of the feldspar structure in the afternoon of December 25, 1932. It was a brilliant solution. Break up the unit cell into boxes using the symmetry constraints. Postulate silicon–aluminum substitution in oxygen tetrahedra. Add a touch of brilliance. Do some tricky calculations. And there it is. Sounds easy, but Taylor beat the competition. Two papers in 1933 and 1934 provided the basis of the long development of crystallographic research in feldspars with key papers appearing on lamellar intergrowths in 1939 and 1940.

To pick up another thread, Taylor has also been a brilliant administrator. After nearly two decades of research and teaching, mostly in Manchester, he was appointed University Reader in Crystallography at the Cavendish Laboratory in 1945. There he built up the Crystallographic Laboratory which covered essentially all aspects of crystallography, including important work on crystal dynamics, metals and alloys, and biological compounds. Many visitors came from abroad, including Bill Bailey, Bob Ferguson, and Paul Ribbe from North America. Many British scientists developed their reputations in the Crystallographic Laboratory, including Bill Cochran, the inventor of the difference-Fourier map, and Peter Hirsch, who developed sub-microscopic techniques for textural study. Particularly important to mineralogists was the appointment of Helen Megaw, whose results on ferro-electrics and silicates are still being exploited.

Let me finish this citation by returning to feld-

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spars. Such was the fame of Taylor's laboratory that a student from Waupaca, Wisconsin, Bill Bailey, was attracted to Cambridge. He became known as the razor king for his skill at cutting tiny cubes with a razor blade. There were no computers then for calculating absorption corrections. Bailey and Taylor proved that the Al and Si atoms are ordered in microcline. Bob Ferguson, Bob Traill, and Paul Ribbe collaborated with Taylor in solving details of the albite structures, and Helen Megaw and co-workers built on Taylor's earlier work on the plagioclase feldspars. Read all about it in the elegant chapter on feldspars in *The Crystal Structure of Minerals.*

President Wones, the Roebling Medal is specifically awarded for creative research, and W. H. Taylor is an outstanding selection. But let me place on record the thanks of so many crystallographers for the additional inspiration of Taylor's creative administration and elegant style. His career is a testimony to the fundamental contribution of crystallography to the advances in mineralogy and petrology, and indeed also to geochemistry and geophysics.

Mr. President, I am deeply honored to present to you such a distinguished pioneer in crystallography for the award of the 1979 Roebling Medal.

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Acceptance of the Roebling Medal of the Mineralogical Society of America for 1979

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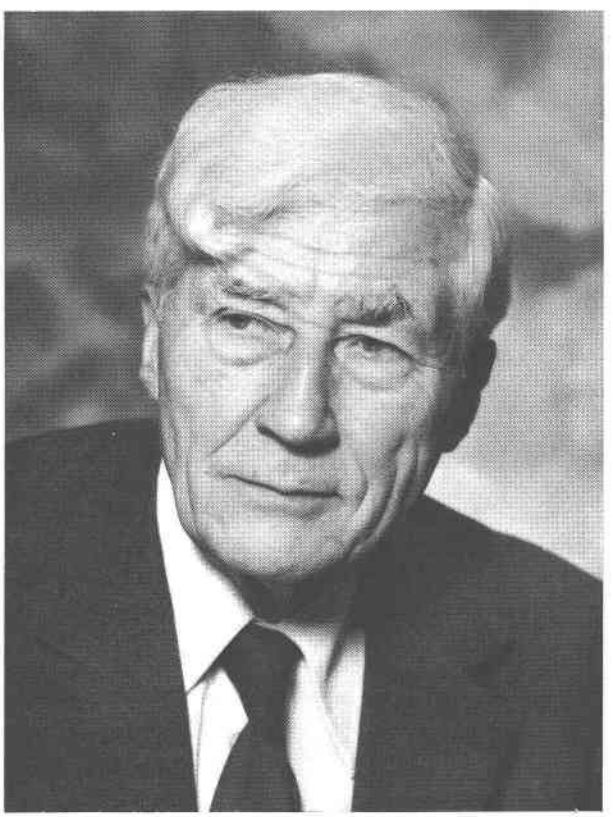
Mr. President, members of the Mineralogical Society of America, ladies and gentlemen:

May I first express my sincere thanks to the Society for the award of the Roebling Medal, which I accept with great pleasure: I am aware that no higher honour for work in this field could be offered. My many friends here would probably agree that I am not often reduced to a state of stunned silence, but when Professor Gibbs telephoned me in Cambridge about a year ago to tell me that I had been named as the recipient of the 1979 Medal, I fear that I became quite incoherent with mingled surprise and delight.

Professor Smith has obviously worked hard on my behalf, and I am grateful that he so willingly agreed to act as my citationist. I liked his light-hearted phrase about 'knocking off' several structures in my early years—at the time it did not feel like that at all. In similar vein, his account of my Christmas afternoon festivities in 1932 might be taken to imply that a couple of hours with a slide rule gave me the feldspar structure—but, of course, mountains of calculations on the feldspars had previously got me nowhere, until a sudden flash (which seemed bound to be correct—and was!) led straight to the solution.



The biographical note printed on your luncheon

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