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# Presentation of the Roebling Medal of the Mineralogical Society of America for 1994 to William A. Bassett

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Mr. President, members, and guests:

I remember meeting Bill Bassett for the first time on August 31, 1964. I was a graduate student then, who had just arrived at the University of Rochester, where Bill worked as a young assistant professor. That was 30 years ago. Since then, the field of mineral physics, as it is called today, has advanced by leaps and bounds. Now, with the direct measurement of mineral properties at high pressures, we not only can test models of Earth and planetary deep interiors but can also gain fundamental understanding of mineralogy and physics in general. Bill has either initiated or made major contributions in most crucial breakthroughs using the diamond cell, which he introduced to the earth science community in 1962 and developed over the ensuing years into an extraordinarily versatile probe for mineralogy, geophysics, and geochemistry.

It is fairly easy to cite Bill's achievements. His impact in the field of mineral physics and chemistry has been phenomenal. Bill's discoveries include the first determination of the crystal structure of high-pressure Fe, which is a major component of the core, and the first observation of phase transformation from silicate spinel to lower mantle phases. He invented the laser method of heating samples at high pressure surpassing the temperature of the Earth's core, and the optical spectroscopic method for in situ temperature determination. His invention of the Merrill-Bassett cell created the new field of high-pressure X-ray crystallography. Bill also originated the application of synchrotron radiation to diamond-cell research. All these inventions have evolved into the dominant methods in our field. These inventions are crucial for nearly all aspects of experimental deep-Earth studies, including the composition, mineralogy, phase transitions, reaction kinetics, and melting temperature of the mantle and core.

With these achievements, it is amazing that Bill could have kept such a low profile. Of course, one reason is that he is extremely modest and unassuming. He has a way of making complicated experiments very simple without losing any essence. To hear him talk about the diamond-cell experiment, you would think it quite suitable for a high-school science project. In fact, my daughter did such an experiment. However, when necessary, he does not hesitate to utilize the most sophisticated physical tool. For example, he spent many years pioneering applications of synchrotron radiation, which has clearly become the future of experimental mineralogy. He has also developed the high-pressure Brillouin spectroscopy, which is the only extant method of obtaining elasticity of minerals at ultrahigh pressures for direct comparison with seismological observations.

The second reason for Bill's hitherto low profile is the fact that he has been approximately five to ten years ahead of the frontier. By the time the rest of us catch up, his pioneering work has already become a standard that everyone takes for granted. For the lucky ones who have followed his trails, the rewards are immense. Looking back at the Mineralogical Society of America Award given out over the course of the past 15 years, we find that the main contributions of at least four awardees can be traced back directly to Bill's pioneering effort.

As for the future frontiers in high-pressure mineral physics, I have already let the cat out of the bag as to what I consider these to be. I believe they are just what Bill is studying currently. So, watch out for these two fields: hydrothermal study and rheological study in the diamond cell.

Mr. President, members, and guests, I am delighted to present the true and modest pioneer of our time, William A. Bassett, the 1994 Roebling Medalist of the Mineralogical Society of America.

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